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ON THE RAPID DETERMINATION OF THE VALUE OF EXTRACT OF MALT.

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It is customary to consider an extract of malt good, if it readily dissolves in water, has a pleasant taste and also remains unfermented for a long time. Worthless preparations may have all these properties, therefore such an examination is only superficial. Thus far no convenient process has been published by which the pharmacist or physician may convince himself of the value of extract of malt. Such a process in daily use by me, may therefore be of interest. A good extract of malt should, I think, possess the following properties in addition to those noted above.

I. The extract should be light in color; dark colored preparations are partly burned, therefore contain neither active diastase nor soluble albumen, and differ from ordinary molasses only in containing dextrin.

II. The free acid should not be present over a certain proportion.

III. The proportion of water and solid matters should be within certain limits.

IV. The principal determination is that of the diastastic strength. A good extract should contain all soluble substances of the malt, of which diastase is the principal one. If the extract contains no diastase it differs little from honey or any other saccharine preparation. The action of diastase on amylaceous substances is wanted if the extract is to possess any value for a sick stomach at all.

Liebig uses powdered malt in preparing his infants' food in order to change the starchy matter before it enters the stomach, into easily digestible compounds. If we consider how much amylaseous food we use which could be changed by a small quantity of diastastic extract of malt into dextrin and sugar, the value of such a preparation in the process of digestion is readily seen. Although the saliva possesses the same properties as the diastase of the malt, the action of the latter is

nearly five times as great as that of the former, and the diastastic action of the malt can stand about four times more acid than that of the saliva without being interfered with.

V. Nitrogenized constituents (albuminates) should be present in an easily digestible form.

These are the principal conditions in the analysis of an extract of malt.

Many put a great value on the soluble phosphates in the examination of the ash, but it cannot be accepted as a criterion of a good extract. The percentage of the phosphates will vary according as hard or soft water is used, and furthermore, these substances can be added to the most worthless preparation. The examination of the ash will not be described here, as directions can be found in every analytical work.

The estimation of the percentage of dextrin and maltose is also of no consequence, as a preparation which has the properties noted above, will have the proper amount of dextrin and sugar.

Estimation of solid matters and water.—20 grams of extract are dissolved in enough distilled water to make the solution weigh 200 grams. With this solution I determine the percentage of extract by means of a Czeczetka's maltometer, which shows the percentage of extract dried at 110°C. Those not in possession of one or of a similar instrument should estimate the specific gravity of the liquid at 17.5°C., and compare the same with a table by Griesmayer, published in "Fresenius' Analytische Zeitschrift," 1880, page 104, in order to determine the amount of extract. Another method is the following:

Specific Gravity.	Extract dried at 100°C.	Specific Gravity.	Extract dried at 100°C.	Specific Gravity.	Extract dried at 100°C.	Specific Gravity.	Extract dried at 100°C.	Specific Gravity.	Extract dried at 100°C.
1·1032...	50 per ct.	1·1202...	58 per ct.	1·1401...	66 per ct.	1·1594...	74 per ct.	1·1818...	83 per ct.
1·1053...	51 "	1·1235...	59 "	1·1425...	67 "	1·1618...	75 "	1·1844...	84 "
1·1075...	52 "	1·1258...	60 "	1·1449...	68 "	1·1668...	77 "	1·1870...	85 "
1·1096...	53 "	1·1281...	61 "	1·1473...	69 "	1·1691...	78 "	1·1897...	86 "
1·1117...	54 "	1·1305...	62 "	1,1497...	70 "	1·1718...	79 "	1·1925...	87 "
1·1138...	55 "	1·1329...	63 "	1·1521...	71 "	1·1741...	80 "	1·1952...	88 "
1·1159...	56 "	1·1353..	64 "	1·1545...	72 "	1·1767...	81 "	1·1979...	89 "
1·1180...	57 "	1·1377...	65 "	1·1569...	73 "	1·1792...	82 "	1·2007...	90 "

A certain weight of extract is dissolved in an equal weight of water, the specific gravity of this solution at 17.5°C. is determined and from the table given the percentage of extract is ascertained. On subtracting the extract from 100 the percentage of water is found.

A good extract containing both diastase and albumen, seldom contains more than 25 per cent. of water. Should the percentage of extract fall to 50 or, as with many so-called beers, to 5 or 6 per cent. diastase cannot be present, as it would not keep in such diluted liquids. To such preparations salicylic acid is usually added to prevent for some time the decomposition of the dextrin. On agitating such a preparation with strong ether, the salicylic acid is easily separated. Evaporate the ethereal solution, dissolve the residue in water and test this solution with diluted ferric chloride, when the salicylic acid is easily recognized by the violet color produced. If we reflect that the addition of one-fourth to one-half per cent. of salicylic acid to solutions of starch renders even preparations very rich in diastase inactive, it becomes obvious that the addition of this acid to an extract of malt is incorrect.

Determination of free acid.—The free acid of freshly prepared extract of malt is almost exclusively lactic acid, but with the age of the preparation other acids are formed, and for this reason I estimate the amount of caustic soda used and note this as percentage. In a solution of pure caustic soda, 5 grams to 1,000 cc. water, each cc. represents 0.005 sodium hydrate. 10 grams of extract are dissolved in 100 grams of water and neutralized with the soda solution. For this purpose a burette graduated into one-tenth cc. is used, and the point of neutralization determined by means of very sensitive litmus paper. With a little practice the estimation of the acid does not present any difficulty. Good extract of malt tested by this method, will seldom require more than 6 to 7 cc. soda solution.

To take an example, suppose 6 cc. soda solution, that is, $6 \times 0.005 = 0.030$ hydrate of sodium to be necessary for complete neutralization of 10 grams of extract of malt, then 100 grams of extract must need 0.30 sodium hydrate. If for 100 parts of extract of malt more than 0.5 sodium hydrate should be required, the durability of the preparation will be doubtful and the diastastic power will soon disappear.

Estimation of Diastastic Strength.—Twelve clear and uniform 2 oz. vials each filled with 2 oz. distilled water and 2 drops of Iodine solution, prepared from 2 grams Iodine, 4 grams Iodide of Potassium

and 250 grams water; a good thermometer and starch mucilage are needed for this purpose.

Ten grams starch are stirred with 30 grams of water and poured into 125 or 150 grams of boiling water. This mixture is stirred and boiled for some time. The thermometer is then introduced and the mucilage is allowed to cool to and kept at a temperature of 100° F. by means of a water-bath.

Ten grams extract of malt dissolved in 10 cc. water are then stirred into the mucilage, the time being accurately noted. After one minute a good extract will have converted the thick mucilage into a thin liquid. As soon as this change has taken place it is necessary to examine the progress of the conversion of starch into soluble starch, dextrin and sugar at the end of every minute, by the following method:

After the expiration of the first minute transfer two drops, by means of a glass rod, into one of the 2 oz. bottles. The bottle is shaken and placed near a window. At the end of every minute repeat this manipulation with a new bottle until the coloration is no longer produced. The time necessary for effecting this change gives the indication as to the amount of diastase present. Undecomposed starch mucilage gives a greenish blue color and after standing some time a blue precipitate. Soluble starch, the first product of the change, yields with iodine, a dark blue solution without a precipitate. If the amount of soluble starch equals that of dextrin and sugar the color of the solution will be purple. As the soluble starch disappears the solution will be of a decided red color if dextrin predominates, or faintly red if the sugar be in excess; and when starch and most of the dextrin have been converted into sugar, the liquid will be nearly or entirely colorless. This experiment is very interesting and is simple to perform.

A good extract of malt should convert its own weight of starch within ten minutes at 100° F.; at 62° F. forty minutes will be necessary for the conversion, and at 150° F. only three minutes. An extract of malt of the above strength will convert five times its weight of starch at 100° F. in forty minutes and eight times that amount in ninety minutes.

Furthermore, an extract of malt which converts its own weight of starch at 100° F. in ten minutes into dextrin and sugar will in the following time digest the following boiled amylaceous articles:

Boiled potatoes,	4	parts in	3	minutes;	16	parts in	15	minutes.			
" rice,	4	"	"	10	"						
" bread,	4	"	"	9	"	16	"	"	45	"	
" crackers,	4	"	"	5	"	16	"	"	25	"	
" sago,	4	"	"	12	"	8	"	"	30	"	

The following experiments made with the view of studying the influence of acids and alcohol on diastase and the conversion of starch are produced in tabular form in comparison with saliva. They may interest many readers, and encourage them to similar investigations.

The experiments were conducted as follows:

1. A paste was made by boiling starch in water until it was thoroughly gelatinous, 5 fluidounces containing exactly 100 grains of starch; the specific gravity of this paste was 1·0117.

2. For each experiment, 5 fluidounces of the paste were mixed in a porcelain capsule with 200 minims of a mixture of equal parts of malt extract and water. The malt solution was freshly prepared each day from the same sample of malt extract, and tested, to secure a uniformity of *diastatic power*. In the experiments with saliva, 100 minims were added to the 5 fluidounces of starch paste. The saliva was collected from a number of persons, both adults and children, and was tested from time to time. The saliva always gave a neutral reaction, while the malt extract always gave an acid reaction, owing to the presence in the latter of $\frac{4}{10}$ per cent. of acid calculated as lactic acid.

3. Before adding the malt extract solution or saliva, the starch paste was by means of a water-bath brought to a temperature of 100° F., and maintained at a temperature ranging from 95° to 100 F. until the experiments were completed.

4. The acids or alkalies were always added to and thoroughly mixed with the paste before adding the malt extract solution or saliva.

5. When the change in the condition of the starch paste operated on was very rapid, it was tested every minute with iodine, otherwise every five minutes. In a few instances the action was so rapid that tests were required to be made in fractions of a minute.

6. The iodine solution was made and used as described above.

7. Except in a few instances, the experiments were discontinued at the end of an hour.

8. The acids were calculated as anhydrous.

100 minims of		Blue, with precipitate after minutes.	Blue, no precipitate after minutes.	Purple after minutes.	Red after minutes.	Nearly colorless after minutes.	Remarks.
Extract of malt	.....	.....	.....	1	2	7	Relative amylolytic power of pure malt extract and saliva.
Saliva	.....	.....	.....	4	6	14	
Ext. malt, with HCl.	$\frac{1}{10}$ pr. ct.	.....	.....	1	.....	2	Amylolytic power of both very considerably increased.
Saliva, with HCl	$\frac{1}{10}$ "	.....	1	5	8	10	
Ext. malt, with HCl	$\frac{1}{30}$ "	.....	.....	.....	.....	.....	Amylolytic power completely arrested.
Saliva, with HCl	$\frac{1}{30}$ "	.....	.....	.....	.....	.....	
Ext. malt, with acetic acid	$\frac{1}{5}$ "	.....	.....	.....	1	2	Amylolytic power more than doubled.
Saliva, with acetic acid	$\frac{1}{5}$ "	.....	.....	1	4	6	
Ext. malt, with acetic acid	$\frac{4}{10}$ "	.....	1	2	3	6	Excellent result with malt extract; action of saliva arrested, in two hours paste only liquefied.
Saliva, with acetic acid	$\frac{1}{10}$ "	60	120	.....	.....	.....	
Ext. malt, with acetic acid	$\frac{1}{2}$ "	.....	1	5	10	12	Diastatic power of malt extract decreased, and arrested when acid exceeded 1½ per cent.
Ext. malt, with acetic acid	1 "	.....	.....	15	25	35	
Ext. malt, with acetic acid	1½ "	5	15	30	65	75	
Ext. malt, with lactic acid	$\frac{1}{20}$ "	.....	.....	1	1½	2	Diastatic power of both increased, that of saliva seven times greater.
Saliva, with lactic acid	$\frac{1}{20}$ "	.....	.....	1	1½	2	
Ext. malt, with lactic acid	$\frac{1}{10}$ "	.....	.....	1	2	3	Action of malt extract increased, of saliva slightly retarded.
Saliva, with lactic acid	$\frac{1}{10}$ "	.....	1	5	10	15	
Ext. malt, with lactic acid	$\frac{1}{5}$ "	.....	.....	.....	1	2	Favorable to malt extract; saliva nearly inert.
Saliva, with lactic acid	$\frac{1}{5}$ "	35	60	.....	.....	.....	
Ext. malt, with lactic acid	$\frac{3}{10}$ "	.....	.....	1	3	5	Lactic acid, one-half per ct., nearly stops all diastatic action.
Ext. malt, with lactic acid	$\frac{1}{2}$ "	.....	1	8	40	60	
Ext. malt.. Mixture of 1 p. HCl, 2 p. lactic and 8 p. acetic acids.	$\frac{1}{10}$ "	.....	.....	¼	½	1	A mixture of three acids, in the proportions indicated most favorable to the action of saliva.
Saliva.....	$\frac{1}{10}$ "	.....	1	2	3½	4	
Ext. malt..	$\frac{1}{5}$ "	.....	½	1	1½	2	
Saliva.....	$\frac{1}{5}$ "	.....	5	25	30	45	
Ext. malt.. Mixture of 1 p. HCl and 8 p. acetic acid.	$\frac{1}{10}$ "	.....	.....	1	2	2½	Absence of lactic acid diminishes diastatic action of both.
Saliva.....	$\frac{1}{10}$ "	.....	1	6	7	12	
Ext. malt..	$\frac{1}{5}$ "	.....	1	2	3	4	
Saliva.....	$\frac{1}{5}$ "	60	.....	.....	.....	.....	

The alkalies used were calculated as anhydrous. In testing the liquids, the proportion of iodine used was sufficiently large to insure an excess of free iodine.

100 minims of		Blue, with precipitate after minutes.	Blue, no precipitate after minutes.	Purple after minutes.	Red after minutes.	Nearly colorless after minutes.	Remarks.
Ext. malt, with Na_2O	$\frac{1}{20}$ per ct.	5	10	15	25	30	$\frac{1}{20}$ per cent. of caustic alkali totally destroys action of saliva, the starch paste becoming thicker instead of being liquefied. By $\frac{1}{10}$ per cent. the action of malt extract is also destroyed. Alkaline carbonates act less energetically.
Saliva, " "	"	60	.....	.....	.....	.....	
Ext. malt, " "	$\frac{1}{10}$ per ct.	15	.....	.....	.....	.....	
Ext. malt, " Na_2CO_3	$\frac{1}{20}$ per ct.	.....	.....	5	.....	10	
Saliva, " "	"	.....	5	30	60	.....	
Ext. malt, " K_2O	$\frac{1}{20}$ per ct.	.....	5	25	30	60	
Saliva, " "	"	2	.....	.....	.....	.....	
Ext. malt, " "	$\frac{1}{10}$ per ct.	2	5	30	60	.....	
Ext. malt, " K_2CO_3	$\frac{1}{20}$ per ct.	.....	.....	5	.....	10	
Saliva, " "	"	5	10	40	60	.....	

Whisky contained alcohol 30 vol. per cent., acid 0·0525, sodium hydrate.
Wine contained alcohol 9 vol. per cent., acid 0·75 (with 0·064 sulphuric acid).
Brandy contained alcohol 30 vol. per cent., acid 0·075.

	THE MIXTURE CONTAINED					TEST WITH IODINE SOLUTION AND TIME.				
	Alcohol. Per cent.	Acid. Per cent.	Starch. Per ct.	Ext. malt. Per cent.	Saliva. Per ct.	Blue, with precipitate. Minutes.	Blue, no precipitate. Minutes.	Purple. Minutes.	Red. Minutes.	Nearly colorless. Minutes.
Ext. malt, with wine	1·5	0·125	3·46	1·73	.....	.....	1	3	4	5
Saliva, "	1·5	0·125	3·46	.....	3·46	.....	1	25	30	45
Ext. malt, with whisky	2·72	0·004	3·7	1·85	.....	.....	1	6	9	10
Saliva, "	2·72	0·004	3·7	.....	3·7	.....	1	10	15	20
Ext. malt, with wine	2·56	0·214	2·9	1·45	.....	.....	.....	3	.....	5
Saliva, "	2·56	0·214	2·9	.....	2·9	60	.....	.....	.....	.....
Ext. malt, with whisky	5	0·0087	3·46	1·73	.....	.....	5	7	8	10
Saliva, "	5	0·0087	3·46	.....	3·46	.....	5	10	12	14
Ext. malt, "	5	0·0087	3·46	3·46	.....	.....	.....	1	2	3
Ext. malt, with wine	5·5	0·46	1·5	1·5	.....	5	60	.....	.....	.....
Extract malt, with wine and water	3·42	0·28	0·99	0·99	.....	.....	.....	3	4	5
Malt, with whisky	8·5	0·014	2·9	2·9	.....	.....	5	10	15	20
Saliva, "	8·5	0·014	2·9	.....	2·9	.....	1	2	3	4
Malt, "	13·33	0·0231	2·31	2·31	.....	.....	2	3	6	7
Saliva, "	13·33	0·0231	2·31	.....	2·31	.....	1	2	3	4
Malt, with brandy	15	0·40	2·08	2·08	.....	.....	1	5	6	7
Saliva, with wine	0·818	0·068	3·7	.....	3·7	.....	.....	1	2	4

The following table shows clearly that alcohol has only a slight influence upon the diastatic action.

	THE LIQUID CONTAINED					TEST WITH IODINE AND TIME.			
	Alcohol. Fluid ounce.	Alcohol. Per cent.	Starch. Per ct.	Ext. malt. Per cent.	Saliva. Per ct.	Blue, no precipitate. Minutes.	Purple. Minutes.	Red. Minutes.	Colorless. Minutes.
Extract of malt	¼	8·85	3·37	3·37	.....	.....	1	3	5
Saliva	½	8·85	3·37	.....	3·39	1	5	20	25
Malt	1	15·6	3·46	3·46	.....	.....	1	3	5
Saliva	1	15·6	3·46	.....	3·46	1	15	20	25
Neutral extract of malt	1	15·6	3·46	3·46	.....	1	15	20	24
Malt	1½	21·7*	3·2	3·2	.....	1	2	3	5

* Starch precipitated.

The last table shows that the diastatic action of extract of malt and of saliva is but little affected by the presence of alcohol in the starch solution, but is influenced by the acid. The small amount of sulphuric acid contained in the wine interferes little with the action of malt extract compared with that of saliva.

DETERMINATION OF THE NITROGENIZED BODIES.

Albuminates.—For this estimation I use a solution of picric acid in water, saturated in the cold; also a glass tube such as is used for the estimation of nitrogen in elementary analyses, divided into one hundred equal parts, the lower five divisions being further divided into fifths, but any tall, narrow glass cylinder, which is divided accurately into equal parts, will answer the purpose. The cylinder is filled with eighty parts of the solution of picric acid and twenty parts of extract of malt, and well agitated until the extract is dissolved with the exception of the albumen, then placed in a vertical position for twenty-four hours and the quantity of precipitate read off. Each division represents 1 per cent. by weight of albumen (nitrogenous matter) dried at 100°C.

The correctness of this estimation is reliable within $\frac{1}{5}$ per cent. and has been verified by a series of elementary analyses, undertaken with

the view of convincing myself of the exactness of this method, which may be approximately proven by coagulating the albumen by boiling. This last method is never exact, since malt contains some nitrogenous matter which is not coagulated by heat.

The average amount of nitrogenous matter contained in extract of malt of the consistency of honey is 3 to 3·25 per cent. A well prepared extract of malt produces, with cold water, a faintly turbid solution, which becomes much clearer if carefully heated to 150°F.

The above described determinations with extract of malt furnish the proof as to whether the preparation is of good quality or is worthless.

Simple Estimation of Dextrin, Sugar and Glycerin.—A polariscope is not always available, and if at hand the instrument must first be tested with pure crystallized malt sugar; the separation of the sugar from dextrin, and the decolorization of the liquid are tedious operations. For these reasons I use this method only occasionally for controlling the results; but the following short process will be found to give quite accurate results.

Weigh from 2 to 5 grams of extract of malt; mix with 20 grams of dry sand which has been previously washed with hydrochloric acid and water, and dry this mixture in an air-bath at 100° C. until it ceases to lose weight. The loss of weight represents amount of water.

Transfer the mixture into a small glass percolator (glass syringe) supported by a wire stand of such a size that the entire apparatus may be weighed on an analytical balance. Dry thoroughly in an air-bath and weigh. Now percolate with strong ether, evaporate the percolate and dry the residue; its weight indicates the *resin of hops*. The apparatus is also dried in the air-bath and weighed; the loss in weight shows likewise the resin of hops.

Then percolate with a mixture of two volumes of absolute alcohol and three volumes concentrated ether until a drop of the percolate heated on a platinum foil will not char. The loss of weight after drying in air-bath represents *glycerin*. A mixture of chloroform and alcohol cannot be used as a solvent for glycerin, as the malt sugar is somewhat soluble therein.

Exhaust the residue completely with stronger alcohol; dry and weigh. The loss of weight gives amount of *sugar*.

The balance, after subtracting the weight of sand is *dextrin* and

albumin. The dextrin may also be extracted with hot water and determined from the loss of weight.

After igniting the sand its weight must be the same as in the beginning. The difference in weight before and after ignition indicates the weight of albumen.

By the methods detailed above I have examined twenty different malt extracts of American and European manufacture; but the publication of the figures obtained would be of no value unless accompanied by the designation of the articles, which appears to be inadmissible.

ANALYTICAL RESEARCHES AND INVESTIGATIONS.

COLLATED BY PROF. FREDERICK B. POWER, PH.D.

On Laserpitin. By Dr. Richard Külz.—Laserpitin is the bitter principle of the white gentian root (Laserpitium latifolium), and is obtained by repeatedly extracting the finely divided root with petroleum ether, the filtered liquids concentrated by distillation, and the residual red-brown liquid allowed to evaporate and crystallize. The crystals are purified by recrystallization from boiling petroleum ether, and then form large colorless crystals of the monoclinic system, having the composition $C_{15}H_{22}O_4$, and melting at 118°C.

Upon heating laserpitin with sodium acetate and an excess of acetic anhydride the acetyl derivative, $C_{15}H_{21}(C_2H_3O)O_4$, is obtained, which crystallizes in short, thick, colorless needles, melting at 113°C.

By the action of KOH laserpitin is split into laserol and angelic acid. The former could be obtained only as a brown resinous mass; the decomposition is presumed to occur according to the equation:

$$2C_{15}H_{22}O_4 + H_2O = C_{20}H_{30}O_5 + 2C_5H_8O_2.$$

—*Chem. Zeitung,* No. 30, 1883, p. 455, from *Arch. Pharm.,* 21, p. 161.

On Coffeine and its Salts. By Dr. H. Biedermann.—The coffeine, dried at 100°C., was found in accordance with the statements of former investigators to have the formula $C_8H_{10}N_4O_2$; it melts at 230.5°C.

Hydrochlorate of Coffeine. $C_8H_{10}N_4O_2$, $HCl + 2H_2O$, forms colorless transparent crystals of the monoclinic system; the hydrobromate has an analogous composition, whilst the nitrate crystallizes with one molecule of water.

The *sulphate*, $C_8H_{10}N_4O_2$, H_2SO_4, is very readily obtained by dissolving the coffeine in about ten times its weight of hot alcohol, to which sufficient H_2SO_4 has been added to impart a strongly acid reaction. Upon cooling it separates in the form of well-developed, transparent, short needles, which are grouped in rosettes.

Coffeine-gold chloride, $C_8H_{10}N_4O_2$, $HCl + AuCl_3 + 2H_2O$, forms golden-yellow, shining laminæ.

The *formiate*, *acetate*, *butyrate*, and *valerianate* were likewise formed; they were all anhydrous, and it is only to be observed that the acetate shows the deviating composition $C_8H_{10}N_4O_2(C_2H_4O_2)_2$.—*Ibid*, from *Ibid*, p. 175.

The Detection of Picric Acid. By G. Christel.—For the detection of picric acid in beer, the author recommends the following method of procedure: 200 ccm. of beer are evaporated on a water-bath to a syrupy consistence; the residue is brought into a small flask, 50 ccm. of alcohol (90 per cent.) are added, the liquid allowed to stand for 24 hours with frequent active agitation, filtered, and the residue treated again with 30 ccm. of alcohol. The mixed filtrates are evaporated to a syrupy consistence, to the residue 4–5 drops of dilute sulphuric acid (1:3) are added, and to the mixture, contained in a test-tube, which may be closed with a cork, 5 to 6 times its volume of ether is added. The mixture is actively agitated, the ether decanted, and the operation repeated with a fresh portion of ether, and the addition of 2 or 3 drops dilute H_2SO_4. The mixed etherial solutions are allowed to evaporate, the residue diluted with water to the measure of 5–10 ccm., filtered and neutralized with ammonia water. In this solution the picric acid may be detected by the known methods; a very delicate reagent therefore is potassium cyanide. 0.2 gm. of powdered sugar with which 0.0001 gm. of picric acid was mixed, afforded a fine rose-red color on the addition of one drop of solution of potassium cyanide.—*Ibid* from *Ibid*, p. 190.

The Detection of Rice Flour in Buckwheat Flour. By Aug. Lehn.—About 1 gm. of the flour was warmed upon a water-bath, with 2 gms. of concentrated solution of potassa and water, until a paste had become formed, and hydrochloric acid then added. With rice flour the paste became yellowish, and, on the addition of HCl, white.

With buckwheat the paste was dark green, and, after treatment with HCl, assumed a red color.

With a mixture of the two the paste became green in spots, and, with HCl, of a flesh color.—*Ibid*, from *Pharm. Centralhalle*, 4, p. 130.

A new Reaction of the Aldehydes. By F. Penzold and E. Fischer. —Upon mixing diabetic urine with an alkaline solution of diazo-benzol-sulphonic acid there appeared, after from 10 to 15 minutes, a red color which gradually assumed a violet tint. The same behavior was shown by a solution of pure grape sugar, and the authors recognized the reaction as one common to the aldehydes, for the detection of which it can be applied. For the application of the test the diazo-benzol-sulphonic acid is each time freshly dissolved in about 60 parts of cold water and a little solution of caustic soda, the substance to be tested, mixed with dilute alkali and a few particles of sodium amalgam are added, and the solution allowed to repose. In the presence of an aldehyde there appears after from 10 to 20 minutes the reddish violet color. In the case of bitter almond oil it may still be detected in the dilution of 1:3000 with perfect certitude.—*Ibid*, No. 32, p. 490, from *Ber. d. Deutsch. Ch. Ges.*, 16, p. 657.

A Contribution to the knowledge of the Putrefaction Alkaloids. By L. Brieger.—If pepton, which has been obtained from fibrin by the action of the gastric juice, and free from putrefaction products (indol, phenols, oxyacids), is evaporated, extracted with boiling alcohol, and the residue remaining after the evaporation of the alcohol taken up with pure hot amylic alcohol, filtered and evaporated, there remains an amorphous mass, which possesses strongly poisonous properties. The substance is readily soluble in water, but insoluble in ether, benzol and chloroform. The aqueous solution affords a white precipitate with phospho-molybdic and phospho-wolframic acids, a yellow precipitate with potassio-cadmic and potassio-mercuric iodides, and a red precipitate with cadmium-bismuth iodide. Auric and mercuric chlorides also produce precipitates in the solution, but not platinic chloride. Iodine solutions give brown precipitates, tannin colors the solution brown, ferricyanide of potassium and ferric chloride blue. The white precipitate obtained by Millon's reagent becomes intensely red on boiling. The toxic subcutaneous dose of the evaporated extract is for frogs 0·05 to 0·1 gm., and for small rabbits 0·5 to 1 gm., death being preceded by a condition of paralysis and drowsiness. The poisonous substance was also prepared once from Witte's dry pepton, but subsequently its preparation from this pepton was no longer successful, and it was confirmed that also this pepton possessed of itself absolutely no poisonous properties, although by the renewed action of artificial gastric juice it afforded small amounts of the poison. The same toxic substance may

be prepared from putrefied albuminous bodies, such as fibrin, casein, the brain, liver, and muscle flesh. The poisonous substance which has recently been repeatedly observed in urine, the author believes to be identical with that obtained from pepton.—*Ber. d. Deutsch. ch. Ges.* 16, p. 807, from *Zischer. f. Physiol. Chem.* vii, 274–281.

On Colocynthin. By Gustav Henke.—The author reviews the various methods adopted by earlier chemists, Meissner, Braconnot, Vauquelin, Lebourdais, Herberger, Bastick, Hübschmann, and Walz, for the obtainment of colocynthin, or the various impure products which have received this name, and subsequently describes the process followed by him, and the true characters of the colocynthin obtained.

Five kilograms of commercial colocynth, deprived of the seeds, were reduced to coarse powder, and extracted four times with alcohol, diluted with an equal weight of water, with the aid of heat. The filtrates were combined, the alcohol distilled off, and the residue extracted with water and filtered. To the clear, bright yellow filtrate a concentrated aqueous solution of tannic acid was added, and the very abundant white precipitate thus formed allowed to deposit. As this required some time, its deposition was accelerated by the addition of powdered pumice-stone, thereupon the precipitate filtered, well-washed, and, after mixing with freshly precipitated carbonate of lead, evaporated on a water-bath to dryness. Upon treating with boiling absolute alcohol the colocynthin becomes immediately dissolved, and, after evaporation and drying over sulphuric acid, forms a brittle, colophonium-like mass. When triturated, it forms a permanent, loose, and bright yellow powder.

Colocynthin is without action upon litmus, and is soluble in 20 parts of cold, or 16 parts of warm water; it is likewise very readily soluble in alcohol, but more difficultly in absolute alcohol. If to the alcoholic solution an excess of ether be added, the colocynthin separates out in the form of white flakes. It is insoluble in chloroform, ether, benzol, carbon bisulphide, and petroleum ether. When heated on platinum-foil it burns away without residue. Besides being soluble in water and in alcohol, it is also very readily dissolved by ammonia-water and an aqueous solution of chromic acid. Concentrated sulphuric acid dissolves it in the cold, forming a deep red liquid, and, upon warming, the colocynthin is immediately destroyed; dilute sulphuric acid is without any action. Concentrated nitric acid dissolves

it in the cold with a bright red color, becoming somewhat darker in warming; dilute nitric acid shows the same behavior, but is much slower in its action. With concentrated hydrochloric acid it forms, even in the cold, a bright yellow liquid, which upon boiling becomes decomposed with the separation of a smeary, dark gray substance; dilute hydrochloric acid dissolves it only by the aid of heat. It is slowly dissolved by fresh chlorine-water, as also by solutions of potassium or sodium hydrate, especially on boiling. The aqueous solution of colocynthin is completely precipitated by tannic acid, with the formation of a very abundant white, flocculent precipitate; acetate of lead produces only a very slight white turbidity. The solution in water is not effected by basic acetate of lead, ferric chloride, argentic nitrate, lime-water, ferrous sulphate, potassium ferrocyanide, mercuric chloride, ammonia, and the alkalies.

When heated with caustic alkali it developes no vapors of ammonia, and therefore contains no nitrogen. The aqueous solution of colocynthin quickly reduces Fehling's solution; if to the aqueous solution a few drops of sulphuric acid be added, a slight turbidity ensues.

Although Walz is stated to have obtained colocynthin in a crystalline form, the experiments of the author upon the colocynthin of his own preparation, as also with that of Walz, Bastick, and Hübschmann, afforded only negative results; it always remained as a smeary mass, becoming brittle upon complete drying. The author furthermore considers the statement of the decomposition of colocynthin into cane-sugar and colocynthein by the action of concentrated sulphuric or hydrochloric acid to be very improbable.

The entire yield of pure colocynthin from 5 kilograms of colocynth amounted to scarcely 30 gms. The statement of Walz to have obtained about 2 per cent. is thus also not confirmed.—*Arch. der Pharm.*, Bd. 221, 1883, pp. 200–205.

Powdered Drugs.—C. L. Becker has examined microscopically forty-two powdered drugs obtained from a retail drug store, and found thirty to be pure. The nature of the supposed adulteration is not stated, or was not determined in powdered asafetida, cloves, jalap and rhubarb. Starch was found in cinnamon; wheat flour in elm bark, mustard (with turmeric), mandrake, poplar bark and valerian; corn meal in fenugreek, and an inferior gum with crystals of silica in gamboge.—*The Microscope*, February, 1883, p. 189.

ALCOHOL TABLES OF THE NEW PHARMACOPŒIA.

By Gustavus Pile.

Read at the Pharmaceutical Meeting, May 15, 1883.

The comprehensive specific gravity tables, indicating the percentage of alcohol, that have been placed in the New Pharmacopœia, are, no doubt, the result of considerable time and labor, yet it cannot but cause a feeling of disappointment to find the familiar tables of Tralles superseded by those of Hehner. In this country, universal custom as well as legal authority, have for so long a time endorsed Tralles as the standard, that he should not have been supplanted by any other without very positive knowledge of inaccuracy. The want of legalized standards for defining the commercial value of chemical products is seriously felt in many instances, in order to prevent misunderstanding and controversy, yet in this case where such authority does exist, we find our long used tables set aside for others whose superiority lies merely in the fact of their completeness. But why not compile just such tables having Tralles for a basis, and thus keep in harmony with law and custom? Besides this, the tables of Hehner do not possess the quality of accuracy to an extent to merit our confidence. I have not had sufficient time to examine the subject fully, but there appears to be considerable variation from what has long been regarded as reliable statements. Hehner began his tables by denoting the specific gravity of water as 1·000 at 60°F., and compared the gravities of the percentages of alcohol with it, that is at the start, but at the end we find absolute alcohol indicated by a specific gravity of ·7938, which is the case when compared with water as unity at 39°F., but when water is taken as unity at 60°F. as he began, it should be represented by ·7946. So we have in these tables two different values used to denote the specific gravity of water as a standard, one at the beginning and another at the end.

The law of the United States defining the term proof spirit, is so very decided, that it seems strange indeed that any other should be given in a work purporting to be a national standard. According to Revised Statute 3249, the law reads as follows: "Proof spirit shall be held and taken to be that alcoholic liquor which contains one-half its volume of alcohol of a specific gravity of ·7939 at 60° Fahr., referred to water as its maximum density as unity." Proof spirit has at 60° Fahr. a specific gravity of ·93353, 100 parts by volume of

the same, consisting of 50 parts of absolute alcohol and 53·71 parts of water. The difference of the sum of the parts of alcohol and water and the resulting 100 parts of proof spirit, is due to the contraction which takes place when alcohol and water combine. This settles the true meaning of the term proof spirit beyond a doubt, and it must be so regarded in all dealings.

The hydrometers used by the revenue inspectors and furnished to them by the government, are based upon the tables as prepared by Tralles, verified and calculated for different degrees of temperature by Profs. Bache and McCulloh. The instruments are made in sets of five, in order to obtain a very open and delicate scale. The No. 1 ranges from 0 to 100; No. 2 from 80 to 120; No. 3 from 100 to 140; No. 4 from 130 to 170, and No. 5 from 160 to 200. The indications represent the percentage of proof spirit and not absolute alcohol.

The English law defines proof spirit by act 58 of George III, where it is stated that proof spirit is that liquor which at the temperature of 51° Fahr. weighs exactly $\frac{12}{13}$ parts of an equal measure of distilled water. Distilled water, which at the temperature of 60°F. as unity, at the above named temperature of 51°F. is 1·00063, $\frac{12}{13}$ of which is ·9236. At a temperature of 60°F. Proof Spirit has a specific gravity of ·9198 and contains 49·24 per cent. by weight of alcohol."

By comparing the figures here quoted, it will be seen that the United States Pharmacopœia gives the standard of Great Britain for proof spirit in preference to that which has been adopted by our own government. It will be seen also that the percentage in England is taken by weight, while here it is taken by volume. In order to determine the percentage by weight when that by volume is known, multiply the specific gravity of absolute alcohol, which is ·7939, by the per cent. by volume, and divide the product by its corresponding specific gravity. Thus: for alcohol of 94 per cent. by volume, first multiply ·7939 by 94, then divide the product, which is 74·6266, by ·8194, the specific gravity of 94 per cent. alcohol, this will give 91 for the equivalent per cent. by weight. It is a fact to be noticed, that the percentage of water by volume in an alcoholic mixture, cannot be estimated merely by subtracting the per cent. of alcohol from 100, for as has already been observed in the case of proof spirit, each 100 volumes contain 50 volumes of alcohol and 53·71 volumes of water, and not equal volumes of each. But by referring to the headings Alcohol and Alcohol Dilutum, in the Pharmacopœia, we find alcohol stated to be a liquid composed of 94

per cent. by volume of ethyl alcohol and 6 per cent. by volume of water, whereas the correct composition is 94 per cent. by volume of alcohol and 7·29 per cent. of water. Also, in the case of alcohol dilutum, the correct proportions are 53 per cent. by volume of ethyl alcohol and 50·73 per cent. of water, in place of 53 per cent. of alcohol and 47 per cent. of water as is there given. The rules here annexed will be found of great service in making alcoholic mixtures for preparing tinctures, etc.

1. To reduce alcohol to any required strength. To as many parts of the given alcohol as are indicated by the percentage required, add sufficient water to make the number of parts of the mixture equal to the percentage of the given alcohol. Example: It is desired to make an alcohol of 30 per cent. from one of 95 per cent. Take 30 fluidounces of the alcohol and add a sufficient amount of water to make 95 fluidounces.

2. To make any required quantity of any per cent. As the percentage of the alcohol given is to that of the alcohol required, so is the quantity desired to the quantity of the alcohol to be taken. And to this quantity of alcohol sufficient water must be added to make up the required quantity. Example: It is desired to make 80 fluidounces of 75 per cent. alcohol from that of 95 per cent. As 95 : 75 : : 80 : $63\frac{3}{19}$. This represents the number of fluidounces of 95 per cent. alcohol that is to be made up to 80 fluidounces by the addition of water.

By these rules allowance is made for any contraction that may take place, and a mixture after being made should be allowed to stand for a short time for such contraction to take place, when a final amount of water is to be added to make up the full measure.

Aromatic Syrup of Liquorice.—Having frequent demands for syrupus glycyrrhizæ aromaticus in combination with salts of quinine, I have adopted the following formula, by which a preparation is obtained not only disguising the bitterness of the alkaloid, but also imparting a delicate aromatic and astringent flavor.

Take of

Extractum glycyrrhizæ fluidum	25 parts.
Extractum aromaticum fluidum	10 "
Mel Rosæ	15 "
Syrupus	50 "

Mix them.

Philadelphia, May 22, 1883. ALLEN SHYROCK.

COMPARISON OF GALENICAL PREPARATIONS OF THE UNITED STATES AND GERMAN PHARMACOPŒIAS.

By the Editor.

In a series of papers published in the present volume we have briefly given the formulas for those galenical preparations of the German Pharmacopœia for which there is no equivalent formula contained in the new Pharmacopœia of the United States. Quite a number of preparations are common to both, either under identical or similar names, and these we propose to consider now. It should be remembered, what we endeavored to explain on page 6 of the January number, that while in this country all liquid preparations are directed to be made so as to obtain a definite weight from a given weight of drugs, the German Pharmacopœia directs the use of a definite weight of *menstruum* to a given weight of drug; the weight of the liquid will therefore be increased by the weight of the matter dissolved. It will be seen that if the drug is directed alike, for instance in the proportion 1: 10, the proportion will be 1 *in* 10, *U. S. P.*, and 1 *to* 10, or 1 in 10 menstruum plus weight of soluble matter, *P. G.;* the latter preparation will then be weaker in proportion to the amount of soluble matter, a difference which in all cases is of no practicable importance, unless the specific gravity of the solvents should vary to any considerable extent, in which case the strength of the preparations compared by *volume* would differ in about the same proportion, but in inverse ratio, as the density of the menstruums.

It is unnecessary, special cases excepted, to give in detail the manipulation directed by the two pharmacopœias. The process of displacement, so largely used in this country, is almost unknown to the German Pharmacopœia, which directs tinctures and similar preparations to be made by maceration, mostly for a week, the liquid to be finally expressed and filtered, without the use of additional menstruum to make up any loss in weight.

The strength of corresponding preparations will be seen from the following condensed formulas:

Acetum Scillæ.—Squill in No. 30 powder, 10 parts; diluted acetic acid sp. gr. 1·0083, sufficient for 100 parts, *U. S.*—Dry squill, 5 p.; alcohol sp. gr. ·832, 5 p.; acetic acid sp. gr. 1·041, 9 p.; water, 36 parts, *P. G.*

Acidum hydrochloricum dilutum contains of HCl. 10 per cent., *U. S.*, 12·5 per cent., *P. G.*

Acidum sulphuricum dilutum.—Sulphuric acid, 1 p.; water, 9 p.; spec. grav., 1·067, *U. S.*—Sulphuric acid, 1 p.; water, 5 p.; spec. gr., 1·110 to 1·114, *P. G.*

Alumen exsiccatum, U. S.; Alumen ustum, *P. G.*—Heat alum, 184 parts to 80°C. until effloresced; then heat to between 200° and 205°C., until 100 parts remain, *U. S.*—Heat alum 100 p. to 50° C., until about 30 p. have been expelled, then increase the temperature to 160° C., until 55 p. remain. *P. G.* The result is practically the same in both cases.

The medicated waters which, with two exceptions, by the U. S. Pharmacopœia are made by dissolving the volatile oils in distilled water, are by the German Pharmacopœia prepared by distillation of water from the drug.

Aqua Amygdalæ amaræ, U. S.—Aqua Amygdalarum amararum, *P. G.*—Dissolve oil of bitter almonds 1 part in distilled water 999 parts, *U. S.*—Bitter almonds 12 parts are pressed cold, then powdered, and macerated for 12 hours with water 80 parts and alcohol sp. gr. ·832, one part; then distil 11 parts, add alcohol 1 part, determine the amount of hydrocyanic acid, and dilute with a mixture of water 5 parts, and alcohol 1 part, so that 1000 parts of the water contain HCy. 1 part, *P. G.*—This determination is made by mixing 27 gm. bitter almond water and 54 gm. water, adding sufficient magnesium hydrate to render the mixture opaque, and a few drops of solution of potassium chromate, and testing with tenth normal solution of silver nitrate until a permanent red color is just produced. The number of cc. of silver solution multiplied with ·01 indicate the per centage of HCy. It may be remarked that, for the determination of the strength of hydrocyanic acid, the U. S. P. has adopted the same process.

Aqua Aurantii Florum, U. S. Aqua Florum Aurantii, *P. G.*—No formula in the latter, merely the description: Clear or slightly opalescent, colorless, of the agreeable odor of orange flowers; preserve it in a dark place.

Aqua Chlori, U. S. Aqua chlorata, *P. G.*—No formula in the latter. The method of testing and the chlorine strength required are identical.

Aqua Cinnamomi.—Oil of cinnamon, 2 parts, water sufficient for 1000 parts, *U. S.*—Chinese cinnamon 1 part, alcohol 1 part, water sufficient. Macerate for 12 hours and distil 10 parts. *P. G.*

Aqua Foeniculi.—Oil of fennel 2 parts, water sufficient for 1000 parts. *U. S.*—Bruised fennel 1 part, water sufficient; distil 30 parts. *P. G.*

Aquæ Menthæ piperitæ.—Oil of peppermint 2 parts, water sufficient for 1000 parts. *U. S.*—Cut peppermint leaves 1 part, water sufficient; distil 10 parts. *P. G.*

Aqua Menthæ viridis, U. S., is prepared like the preceding, using oil of spearmint. The corresponding water of the German Pharmacopœia is *Aqua Menthæ crispæ* prepared like peppermint water, using the leaves of the cultivated crisped mint.

PRACTICAL NOTES FROM VARIOUS SOURCES.

BY THE EDITOR.

Reagents for Alkaloids.—R. Palm directs attention to the following reactions: Sodium sulphantimoniate yields in nearly neutral solutions of alkaloids precipitates consisting of sulphide of alkaloid and antimony; in very dilute solutions the precipitates are at first colorless or milky, but in contact with air change to yellowish; in more concentrated solutions they are at once yellow or red-brown. Most of these precipitates are soluble in excess of the precipitant.

Chloride of lead dissolved in water or in solution of sodium chloride yields with most alkaloidal salts colorless crystalline precipitates. A concentrated solution of sodium chloride precipitates bebeerine, the alkaloid of bebeeru bark, completely as hydrochloride, a behavior which may be useful in the preparation of this alkaloid.—*Chem. Ztg.*, April 29, 1883; *Zeitsch. Anal. Chem.*

Anhydrous Calcium Chloride.—A. Weber shows that crystallized calcium chloride, on being heated to 200°C. (392°F.), parts with all its water, retaining only a minute quantity of it, and leaving a porous mass, which for most uses is far preferable to the granulated, frequently hydrated salt, and to the fused salt, which is too compact. The porous mass, obtained as stated, was found to contain 0·5 per cent. CaO, which amount by subsequent fusion was increased to ·38 per cent. The calcium oxide results from a decomposition of the chloride by the last traces of water, hydrochloric acid being given off.—*Berichte*, 1882, p. 2316.

Pencils of chloride of zinc are made so as to contain either one part

or two parts of wheat flour to one part of the chloride. C. Schmidt recommends triturating the zinc chloride in a warm mortar to a fine powder, when it will have a moist appearance; the wheat flour, previously well dried, is then rapidly incorporated by kneading, without the addition of water; the mass is rolled out upon paper into thin cylinders, these are well dried in a drying oven, and by dipping into melted white wax are thinly coated, and may thus be preserved.—*Phar. Zeitung*, No. 31, 1883. See also *Amer. Jour. Phar.*, 1878, p. 345.

Chloral hydrate as a purgative has been recommended by Dr. Bonatti, in combination with senna, as follows:

Infus. sennæ, . .	(*e* 6·0 — 12·0 gm.)	300·0 gm.
Chlorali hydrat., . . .	. 1·5 — 3·0 gm.	
Syrupi, ...	. 30·0 gm.	

Drastic effects have been obtained with this mixture after failure with jalap and croton oil.—*Schweiz. Woch. Phar.*, 1883, p. 102; *D. Med. Zeitung.*

Tamar Indien.—"L'Union Pharmaceutique" publishes the following formula for its preparation: Mix pulp of tamarinds 450 gm., powdered sugar 40 gm., powdered milk sugar 60 gm., glycerin 50 gm.; evaporate to the consistence of a soft extract and add powdered senna 50 gm., powdered anise 10 gm., oil of lemon 3 gm., tartaric acid 3 gm.; form this mixture into 100 boluses, and after exposing these to the vapors of water roll them in a powder composed of cream of tartar 5 gm., sugar and milk sugar each 35 gm., tragacanth 3 gm., tartaric acid 2 gm., and red saunders 25 gm. Dry and wrap in tinfoil.—*Jour. Phar. d'Als.-Lorr.*, 1883, p. 93.

Tinctura Dentifricia.—Dissolve kino and extract of krameria, each 100 parts, in alcohol, 1,000 p., and add tincture of tolu, tincture of benzoin, oil of peppermint, each 2 p., and oil of anise 1 part.—*Monit. Méd.*

Cleaning of Sponges.—For removing the greasiness of toilet sponges that have been in use for some time, M. v. Valta recommends the following: the sponge is first washed with water as well as possible, then placed upon a plate, a little powdered calcium chloride being sprinkled over it and allowed to liquefy; after about 30 minutes it may be washed with water and dried, when it will have an appearance like a new sponge.—*Phar. Zeitung*, 1883, No. 27.

ON THE RELATIVE STRENGTH OF CERTAIN PREPARATIONS OF THE OLD AND NEW PHARMACOPŒIA.

By John M. Maisch.

The line of duty mapped out by the Pharmacopœial Convention of 1880, for the Committee of Revision, necessitated certain changes in the processes for galenical preparations. The instructions under which these changes had to be made comprised, 1. The abandonment of measures of capacity; 2. The preparation of all tinctures, wines, etc., in which a slight variation of dose is of no importance, in such a manner as to be as nearly as possible of a uniform strength, (1 drug in 5, 10, etc., tincture), and 3. The avoidance of any material change in strength of tinct. aconiti rad., tinct. nucis vomicae, tinct. opii and tinct. veratri vir. At the same time it was stipulated that all liquid opium preparations, paregoric excepted, should represent 10 per cent. of the drug if found advisable. These instructions, which in the main were a repetition of those formulated in 1870, have been carried out, and a table has been appended to the Pharmacopœia, (pp. 454 455) drawing special attention to the difference of strength in the preparations of the old and new pharmacopœia, and giving this difference in a simple proportion, one of the factors being usually 10. On carefully examining this list, it will be found that the majority of the preparations there enumerated are either little employed or have been changed in strength so little that no change in the accustomed *average* dose is required. Under the clauses cited above the committee would have been justified to decrease the strength of tinct. verat. vir. from 55 (in 1870) to 40 (instead of 50) per cent. so as to make it uniform with the present tinct. aconiti rad., or the latter preparation might have been increased in strength from 47·6 to 50 (instead of being decreased to 40) per cent., so as to make it uniform with tinct. verat. vir.

The table referred to gives, very nearly, the changes in relative strength correctly; but the question may not seem to be out of place as to the *actual* difference observed at the dispensing counter. For practical purposes this should not be expressed in a formidable looking proportion or in a percentage, but rather in a concise statement of the weight of the drug represented in a given measure. For it is by measures that most physicians order liquid medicines to be dispensed, and it is by measures that most prescriptions are compounded.

Granting the accuracy of the graduates in use, the correctness in reading off, and the temperature as influencing expansion, are to be taken into consideration, and it was from these views that the writer proposed some months ago at a Pharmaceutical Meeting of the Philadelphia College of Pharmacy, that the weight of a fluid ounce of the more important tinctures of the old and the new pharmacopœia be ascertained.

At the last Pharmaceutical Meeting, lists giving the results of such weighings by Dr. Wolff, Messrs. Wiegand, Robbins and Lowe, were presented and referred to the writer for proper arrangement. All these weighings were made within the past two months, when the temperature varied but little from 60° F. In one series a narrow tube was used, properly gauged to one fluid ounce; in another series a specific gravity (1000 grain) bottle was used and the weight of a fluid ounce ascertained by calculation; in two series graduates, the correctness of which had been proven, were employed. The results are in nearly all cases practically alike, the variation of the weights being mostly insignificant, and of no influence on the average dose; they are such merely as may always be expected when measures of capacity of the form generally in use, are employed; in a few cases the weights scarcely exceed that of a fluid ounce of officinal alcohol at 60° F. (373·6 grains.)

In the following table the lowest (*L*) and highest (*H*) weights are given, together with the mean (*m*) of all results; when only one determination was made, or when the results were identical, the weight has been placed in the column of average weights. The column giving the weight of active drug necessarily gives the theoretical weight U. S. P., 1870, without taking into consideration the actual variations in measure.

When calculated from the proportions stated in the table of the Pharmacopœia, the following figures are obtained as representing the assumed weight of the active drug contained in one fluidounce: tinct. acon. rad. 151·26, tinct. calumbæ 40, tinct. capsici 21·43, tinct. lobeliæ 80, tinct. myrrhæ 75, tinct. opii and tinct. opii deod. 41·7, tinct. valerianæ 80, spiritus camphoræ 40 grains. It will be observed that five of these tinctures, as they would be dispensed, show less variation from those of the old Pharmacopœia than is shown by calculation, while the remaining three are somewhat stronger, and spirit of camphor is slightly weaker.

Tinctura	Weight of 1 fluidounce.						Active drug in 1 floz., weight in grains.			
	U. S. P., 1870.			U. S. P., 1880.			U. S. P., 1870.	U. S. P., 1880.		
	L.	H.	m.	L.	H.	m.		L.	H.	m.
Aconiti rad	383	395	380	379	385	383	180	151	154	153
Belladonnæ	422	443	433	417	434	425	60	62·5	65·1	63·7
Calumbæ	.....	.....	.....	408	423	415	60	40·8	42·3	41·5
Capsici	417	428	423	.....	.....	389	15	.....	.....	19·5
Cardamomi	418	455	436	.....	.....	440	60	.....	.....	66
Cardam. comp	.....	.....	448	410	438	420	21	20·5	21·9	21
Cinchon. comp	.....	.....	.....	406	408	407	48	40·6	40·8	40·7
Cinnamomi	403	424	414	.....	.....	415	45	.....	.....	41·5
Digitalis	424	442	435	.....	.....	444	60	.....	.....	66·6
Gentianæ comp	.....	.....	444	419	452	433	30	33·5	36·1	34·6
Hyoscyami	420	435	428	.....	.....	438	60	.....	.....	65·7
Iodi	.....	.....	.....	394	400	397	29	31·5	32	31·7
Krameriæ	.....	.....	426	.....	.....	426	90	.....	.....	85
Lavand. comp	.....	.....	393	.....	.....	408				
Lobeliæ	.....	.....	433	.....	.....	427	60	.....	.....	85
Myrrhæ	.....	.....	391	370	376	373	45	74	75·2	74·6
Nucis vom	.....	.....	387	.....	.....	375	12*	.....	.....	7·5
Opii	.....	.....	.....	420	447	435	37·5	42	44·7	43·5
Opii camph	.....	.....	.....	427	440	435	1·8	1·71	1·76	1·74
Opii deodor	441	454	448	.....	.....	455	37·5	.....	.....	45·5
Sanguinariæ	.....	.....	406	.....	.....	423	60	.....	.....	63·4
Valerianæ	.....	.....	436	420	424	422	60	84	84·8	84·4
Spir. camphor	.....	.....	.....	.....	.....	380	56	.....	.....	38

* Extract = 120 grains of nux vomica.

The tincture which has attracted most attention is tinctura opii, the strength of which, under the instructions of the Convention, was increased about 14 per cent. (one-seventh), with the view of decreasing that of the wine and vinegar of opium, and thus rendering all the strong liquid opium preparations of uniform percentage strength. To what slight extent this change of the tincture affects the dose is readily seen by comparing the former theoretical strength with the results practically obtained with the new tincture:

	U. S. P., 1870.	U. S. P., 1880.		
		I.	H.	m.
One grain of opium is contained in	12·8	11·43	10·74	11.04 min.
10 minims represent powdered opium,	·781	·875	·931	·917 grs.

It is obvious that the difference would be still less if the new tincture had been measured at our average summer temperature. Owing to the larger amount of water contained in the deodorized tincture of opium, this represents one grain of opium in 10·5 minims.

Besides the above a considerable number of the tinctures of the U. S. P., 1870, have been weighed; on obtaining similar determinations made with the corresponding preparations of the U. S. P., 1880, the subject may perhaps be discussed again, doubtless leading to the same conclusion, that, with very few exceptions, the changes are such that the ordinary or average dose is scarcely affected. That the recognition by the Pharmacopœia of the high commercial quality of powdered opium does not influence the relative strength of the liquid opium preparations has been shown before. (See "Am. Jour. Phar.," 1883, p. 55.)

NOTE ON ESSENCE FROM GREEN GINGER.[1]

By C. Symes, Ph.D.

The increased use of ginger by manufacturers of mineral waters and others, of late years, has created a demand for a "soluble essence," *i.e.*, an essence which, when mixed with water, causes little or no opacity therein.

Dr. Thresh's scientific investigation of the constituents of this rhizome, particularly of the nature of its resinous constituents, added considerably to our knowledge of its composition. But strange to say, the process devised by him[2] on the basis of this investigation, for the preparation of a soluble essence did not give (to my mind) very satisfactory results. Indeed, Dr. Thresh has since testified to the superiority of an essence produced by another maker.

It would seem, therefore, that the field is still open for the application either of science, or the results of experience. The contribution I have to offer this evening is a simple, short, and practical one. Many, indeed most, drugs deteriorate by age, whilst some few, such as *Rhamnus Frangula* bark, are said to improve as they grow older, at least to a certain point. Now, it occurred to me, that the nature and

[1] Read at an Evening Meeting of the Pharmaceutical Society, April 4, 1883.
[2] See "Amer. Jour. Phar.," 1878, p. 494.

properties of ginger, and its behavior towards certain solvents of its active constituents, may not be constant at all periods, and the receipt from Rio Janeiro of a supply of green ginger grown at Santa Catharina, enabled me to make an experiment in this direction. The ginger, of which I have here a sample, occurs in large pieces; it is quite soft, and is not decorticated. Two methods were tried for removing the outer portion; the one simple scraping, the other by first soaking in boiling water. The latter did not appear to possess any special advantage, and by the former it lost fully 15 per cent. of its weight. After a few hours' exposure to the air it was weighed, thoroughly dried and reweighed, when it was found to have lost 65 per cent. of moisture.

Taking a sample of the ginger from which the epidermis had been removed, and which had been surface-dried by exposure for a few hours to the air, I cut it in thin slices, and macerated it for some days with an equal weight of rectified spirit, which, when filtered, yielded an essence possessing a very fine aroma, and which when mixed with water scarcely rendered it turbid in the least degree. It is fairly strong, and could doubtless be prepared stronger were the drying of the ginger carried a little further. Probably, however, its solubility would diminish if the drying were completed, and of course the result would cease to be essence of green ginger.—*Phar. Jour. and Trans., April 7, 1883.*

LITHIÆ CITRAS.[1]

By C. Thompson.

It is very difficult to say when this salt was first used in medicine. Dr. Ure, in 1843, introduced the carbonate as a specific for gout, pointing out the remarkable solvent power of lithia over uric acid compared with the other alkalies, hence its great use in cases of gout. The urate of sodium with which gouty patients all seem charged, is converted into the more soluble lithia salt, and so washed out of the system.

In 1857, Drs. Garrod and Ringer mention using strong lotions of lithia salts to disperse gouty swellings. Lithium citrate was not officially recognized until 1864, when it appeared in the new British Pharmacopœia of that date. It appeared in the United States Phar-

[1] Read before the Chemists' Assistants' Association, February 21st, 1883.

macopœia in 1870, also in the revised edition lately published, and these are the only two Pharmacopœias in which it is recognized.

The German Pharmacopœias of 1872 and 1882 have the carbonate, but not the citrate, and the same is the case with the French Codex.

The instructions for making this salt are different in each Pharmacopœia.

In the British of 1864, the directions are:—

Take of

Carbonate of lithia	50 grs.
Citric acid in crystals	90 grs.
Warm distilled water	1 fl. oz.

Dissolve the citric acid in the water and add the carbonate in successive portions, applying heat until the effervesence ceases, and a perfect solution is obtained. Evaporate by a steam or sand bath until water ceases to escape, and the residue is converted into a viscid liquid. This should then be dried in an air oven at about 240° F., then rapidly pulverized, and enclosed in a stoppered bottle. The process in the British Pharmacopœia for 1867 is exactly the same.

In the United States Pharmacopœia for 1870, we find:—

Take of

Lithium carbonate	100 grs.
Citric acid in crystals	200 grs.
Distilled water	2 fl. oz.

Dissolve the citric acid in the water, gently heated, and to the solution gradually add the carbonate until perfectly dissolved, heating the mixture, so long as effervescence is produced. Evaporate by means of a steam or sand bath to a viscid consistence, dry the residue in an oven, at a temperature of about 240° F., then rapidly pulverize, and preserve in a stoppered bottle.

In the revised Pharmacopœia of the United States, lately issued, no process is given in accordance with the decision to omit processes except where necessary to insure a particular result.

Neither the proportions of the British Pharmacopœia nor that of the United States Pharmacopœia are correct, for the former having an excess of carbonate gives an alkaline product, whereas the latter, having an excess of citric acid gives an acid product.

As Mr. Umney pointed out in a paper read at the Pharmaceutical Conference of 1875, if the formula—

$$3\ Li_2CO_3 + 2(H_3C_6H_5O_7, H_2O) = 2\ Li_3C_6H_5O_7 + 5\ H_2O + 3\ CO_2$$

be accepted as correct, then 100 parts of carbonate of lithium will be required to neutralize 189·2 parts of citric acid, the product of anhydrous lithium citrate being identical with the amount of citric acid originally employed in the operation. But as the best commercial carbonate of lithium does not contain more than 98·5 per cent. of real carbonate, the proportion will be 100 parts of carbonate to 186·5 parts of citric acid.[1]

Lithium citrate, according to Mr. Umney, when prepared from these proportions and dried until anhydrous, is neutral to test paper.

According to the 1864 Pharmacopœia, lithium citrate is a white, amorphous powder, *deliquescent*, and soluble in water without leaving any residue. Heated to redness, it blackens, evolving inflammable gases, and the residue, neutralized by hydrochloric acid, yields with rectified spirit a solution which burns with a crimson flame. Twenty grains of the salt burned at a low red heat, with free access of air, leave 10·6 grains of white residue.

The U. S. P. of 1870 gives the following characters and tests by which this salt may be recognized ;—

"A white powder, *deliquescent* and soluble in 25 parts of water; upon ignition it leaves a residue which if dissolved in dilute muriatic acid gives a solution, which burns with a crimson flame, showing the presence of lithium. The citric acid is indicated by the solution becoming turbid when heated with lime-water and clear again on cooling. Twenty grains of this salt burned at a low red heat, with free access of air, should leave $10\frac{6}{10}$ grains of white residue." The revised edition, before alluded to, gives a much fuller account of the characters and tests.

"A white powder, *deliquescent* on exposure to air, odorless, having a slight cooling, faintly alkaline taste, and of a neutral reaction, soluble in 5·5 parts of water at 15° C. and in 2·5 parts boiling water; only slightly soluble in alcohol. When exposed to a red heat, the salt chars, emits inflammable vapors, and finally leaves a black residue having an alkaline reaction, which imparts a crimson color to a non-luminous flame. The aqueous solution of the salt mixed with test solution of calcium chloride deposits a white precipitate on boiling. On dissolving the residue left on ignition in diluted hydrochloric

[1] In some formulæ for new medicaments adoped by the Paris Pharmaceutical Society, it is recommended to use 100 parts of carbonate of lithium to 186 parts citric acid.—(*Pharm. Journ.*, July 21, 1877).

acid, and evaporating the filtered residue to dryness, 1 part of the residue should be completely soluble in 3 parts of absolute alcohol, which when ignited, should burn with a crimson flame, and the addition of an equal volume of stronger ether to the alcoholic solution should produce no precipitate (salts of alkalies absent). On dissolving another portion of the residue in a small quantity of water, the solution should produce no precipitate with the test solution of ammonium oxalate (salts of alkaline earths). The aqueous solution should remain unaffected by sulphuretted hydrogen or ammonium sulphide (absence of metals)."

Lithium citrate, as Squire remarks, is not deliquescent. It appears in commerce either as a crystalline or pulverulent substance. When crystalline its composition is exceedingly uniform; when in powder its composition is rather apt to vary, and does not resemble the citrate of lithium of the B. P., which is anhydrous; whereas Mr. Umney found in an examination of some ten different samples, in no case more than 84 per cent., while most were about 74 per cent. of anhydrous salt.

Mr. Umney dried the specimens examined first at 100° C., and then finished at 115° C., or so as to produce the official article; the difference between the two dryings is about[1] 5 per cent., corresponding to about 1 molecule of water, so that, if the formula $Li_3C_6H_3O_7.4H_2O$ be accepted, then the salt dried at 100° will lose 3 of these 4 molecules of water. This was the composition of some crystals of pure lithium citrate, made by Mr. Sandford and presented to Mr. Umney, which contained about 73 per cent. anhydrous citrate.

Out of four samples examined by me, one contained 86 per cent., another 83·5 per cent., and the other two 75·2 per cent. of anhydrous citrate of lithium.

But not only does the commercial article contain water of crystallization, but other substances, distinct impurities,[2] the most common of which are calcium, magnesium, potassium and sodium, and sometimes traces of the heavier metals. Occasionally the citrate is found adulterated with powdered petalite, bitartrate of potassium, etc. Before proceeding to discuss the methods of detecting and estimating these impurities, it will be as well to see how they get into the citrate.

[1] Since writing the above Mr. Umney has found that this varies considerably.

[2] Mr. W. L. Scott, out of twenty-seven samples of lithium salts, found sixteen pure, six fair, and five adulterated with Na_2CO_3, $KHC_4H_4O_6$, powdered petalite, etc., etc. ("Year-Book of Pharmacy," 1870, p. 452).

There are two sources :—

1st. The carbonate of lithium.

2d. The citric acid.

The chief impurities in the carbonate are calcium, potassium, and sodium chlorides.

The citric acid may contain tartaric acid, salts of potassium and calcium, together with iron, lead and copper.[1]

The mineral lepidolite, a silicate of aluminium, potassium and lithium.

Petalite, a silicate of aluminium, sodium and lithium.

Triphyline, a phosphate of iron, manganese, sodium, and lithium, and

Spodumene, another silicate of aluminium, sodium and lithium, are the principal sources whence the lithium carbonate of commerce is derived.

A description of two of the processes by which the carbonate of lithium is prepared from lepidolite, etc., may be interesting, as showing how the impurities before alluded to come to be present in the carbonate.

1. Schering's process for obtaining lithium carbonate from lepidolite, which is the greatest source of the lithium.—The lepidolite is ground up, treated with strong sulphuric acid. It is heated with constant stirring until it gains consistency enough to be made into balls. which are then introduced into a reverberatory furnace. The slight excess of sulphuric acid is driven off at a gentle heat, the temperature is then raised, and the pieces, while still hot, are treated with water in vessels lined with lead. Silica is then removed by filtration, and to the lye sufficient carbonate of potassium is added to convert all the alumina present into alum, as lithium does not replace potassium in alum. The alum meal separating on boiling is removed, and the small remaining quantity of alum is precipitated by milk of lime; all the lyes are united, the salts converted into chlorides by treatment with barium chloride, the liquid is evaporated to dryness, and the lithium and calcium chlorides are extracted with absolute alcohol in order to separate them from the barium, sodium and potassium chlorides present. The calcium is separated by ammonium oxalate. Any heavy metals which may happen to be present are got rid of by ammonium sulphide. The lithium chloride is evaporated to dryness in a large

[1] A. H. Allen, *Chem. News*, xxxi., 277.

silver vessel, treated with ammonia and ammonium carbonate and the resulting lithium carbonate washed to free it from chlorides.

2. Frost's method for obtaining lithium carbonate from lepidolite.—Fuse together lepidolite, well powdered, 10 parts; barium carbonate, 10 parts; barium sulphate, 5 parts; potassium sulphate, 3 parts. The heavy silicate and sulphate of barium sink to the bottom, whilst a layer of sulphates of potassium and lithium floats on the surface of the fused mass. These are then extracted by lixiviation, and the sulphates are converted into chlorides by precipitation with chloride of barium. The liquid is evaporated to dryness and the potassium and lithium chlorides are separated by treatment with a mixture of absolute alcohol and ether, which dissolves the lithium and leaves the potassium. Ammonia and ammonium carbonate are then added and the carbonate of lithium is collected and well washed. It will be seen that the impurities, *i. e.*, the calcium, potassium and sodium chlorides, are very difficult to separate entirely from the lithium, owing to the partial solubility of potassium and sodium chloride in alcohol.

Both the B. P. and the U. S. P. recommend, as a means for the quantitative estimation of the citrate, incineration, at a red heat, and weighing the residue as carbonate, when 53 per cent. (52·8 per cent.) should be obtained.

This method is useless as a means of estimation of the amount of lithium present, for the carbon cannot be entirely got rid of without very prolonged heating, by which means the carbonate becomes caustic; the resulting greyish-white mass is very deliquescent, thus introducing another source of error.

An improvement on this method is given in the "U. S. Dispensatory," where it is directed to incinerate and treat the mass with sulphuric acid, and weigh the resulting sulphate of lithium. 100 grains citrate should yield 22·3 (78·57, Edit. "Am. Jour. Phar.") grains of sulphate.

In making an analysis of lithium citrate, the probable impurities and adulterations to look for are powdered petalite or lepidolite, salts of calcium, potassium and sodium.

First as regards powdered petalite or lepidolite. Take a weighed quantity (1 to 2 grams), and treat with boiling water; if any of the powder remains insoluble, this must be collected, washed, incinerated, and weighed. For calcium:—Take about 5 grams, dissolve in water, add ammonium oxalate, collect, wash, incinerate, and weigh as $CaCO_3$.

The real difficulty is when it comes to the estimation of the potas-

sium, sodium, and of the lithium present in the samples. There are four processes for this, all starting with the salts as chlorides; therefore a weighed quantity of the citrate is to be taken, incinerated in a platinum crucible, and the greyish-white mass dissolved up in as small a quantity as possible of dilute hydrochloric acid, and then having the salts present as chlorides, either one of the following four processes may be proceeded with.

1. Kobell separates the potassium by precipitation as platino-potassium chloride, and separates the sodium and lithium by heating the mixed chlorides to incipient fusion in a platinum crucible (care must be taken not to raise the temperature too high, or else some of the sodium chloride will be volatilized), then weighs the residue; he leaves it exposed for twenty-four hours to an atmosphere not moist enough to attack the sodium chloride, till the lithium chloride, which is very deliquescent, has absorbed water, drenches the partly deliquesced mass with alcohol, decants carefully, repeats the washing and decantation a second time and weighs the residual sodium chloride.

According to the author this process gives exact results.

2. Mayer's process, as given by Fresenius. Add to the solution (of the chlorides before mentioned) a sufficient quantity of sodium phosphate (which must be perfectly free from phosphates of the alkaline earths—this is very important), and enough soda, either carbonate or hydrate, to keep the solution alkaline; evaporate the mixture to dryness, pour water over the residue, in a sufficient quantity to dissolve the soluble salts by the aid of a gentle heat. Add an equal volume of a solution of ammonia, digest at a gentle heat, filter after standing for twelve hours, and wash the precipitate with a mixture of equal volumes of water and ammonia. Evaporate filtrate and first and second washing to dryness, and treat the residue the same way as before. If any phosphate is obtained add it to that previously obtained. The phosphate is then dried and weighed.

The formula of the phosphate is Li_3PO_4. Rammelsberg asserted that a variable quantity of lithium sodium phosphate was formed. Fresenius, however, confirmed Mayer's work, and showed that no double phosphate was formed.

According to Mayer this process gives 99·61 for every one hundred of lithium, and Fresenius obtained 99·8 per cent. The phosphate is not a very soluble body, 1 part dissolving in 2,539 parts of pure, and 3,920

parts of ammoniated water. This is the best and surest method of estimating the lithium.

Another process is to separate the potassium as platino-potassium chloride, then shake the mixed chlorides of sodium and lithium, dried at 120° C., with a mixture of ether and absolute alcohol for twenty-four hours, until the salts are disintegrated, decant on to filter, and treat the residue again with several smaller portions of alcohol and ether. It is best, in order to be as accurate as possible, to distil off the alcohol and ether and again treat the impure lithium salt with alcohol and ether, a drop of hydrochloric acid being added. This method is not a very reliable one, however.

Bunsen, seeing the difficulty of separating the lithium and sodium by the alcohol treatment, devised an indirect method of determining the potassium, sodium and lithium.[1]

The solution of the chlorides of potassium, sodium and lithium is treated with nitrate of silver and the total amount of chlorine present determined; the filtrate is freed from excess of silver nitrate by hydrochloric acid, and the potassium contained in the filtrate determined by platinic chloride. The potassium thus determined, gives, when subtracted from the total chlorides, a remainder: $A=x(LiCl)+y(NaCl)$ and the quantity of silver chloride equivalent to a known weight of potassium chloride gives, when subtracted from the total weight of silver chloride, a weight B., whence quantity of lithium chloride is calculated by the formula $x=1{\cdot}0823\ B-2{\cdot}6525\ A$

As the citrate of lithium in crystals has been shown to be a non-deliquescent body, and all manufacturers now acknowledge that they can make it, although when the Pharmacopœia of 1867 was brought out they were dead against the crystalline article, it is to be hoped that in the Pharmacopœia of the future there will be found the crystalline body as the official citrate.

If this be the case, there will not be much fear of so great a dissimilarity between the commercial article and the official article.

I cannot close my paper better than by giving Mr. Umney's opinion on the crystalline body[2]:—

"The crystals are quite definite and reliable, and if indeed it were thought necessary to have a citrate containing less water, then let it be dried at 100°, which will be quite enough.

[1] Watt's "Dictionary," vol. iii.

[2] "Year-Book of Pharmacy," 1875, page 559.

"I suppose the reason why the 1864 Pharmacopœia orders the anhydrous citrate, was to lessen the objections to the salt on account of its supposed deliquescence."—*Phar. Journ. and Trans. March 24, 1883.*

REMARKS ON SOME MEDICINAL PLANTS OF CEYLON.[1]

By W. C. Ondaatje, F.L.S., Colonial Surgeon of Ceylon.

It is well known that several Indian drugs have been incorporated into the British Pharmacopœia, which have added to the number of remedial agents, thus conferring no small advantage on the medical profession, and the publication of the Pharmacopœia of India has conferred an incalculable benefit on the medical practitioner in the East, but still there are many medicinal plants of the colonies and India which deserve a scientific examination.

The public revenue of the colonies is applied to many useful purposes for promoting the general welfare of the people. I believe that if a sum of money were voted annually to be expended in carrying out the chemical examination of indigenous drugs and other products by competent persons in this country, all expenditure would be well repaid by the advantages reaped in the saving of Government expenses for medicines, and in the demand created for native products.

It is a matter of great importance to the millions in the East, and in fact to the whole community, that they be enabled to avail themselves of efficient substitutes for many official drugs which our colonies supply.

I may here mention that the annual cost of drugs for the use of the public service of Ceylon forms a considerable item. The natives are now more largely availing themselves of European medical practice, since the extension of Government hospitals and dispensaries, and consequently an increasing expenditure under this head cannot be avoided without detriment to the best interests of the population.

The necessity for adopting such a measure as I have suggested will be apparent to those who have studied Indian drugs.

The natives of the East have attributed imaginary properties to many plants and drugs, and much that is absurd is mixed up with much that is valuable.

[1] Read at an Evening Meeting of the Pharmaceutical Society, April 4, 1883.

While clinical observations in hospitals and medical colleges are of much importance to ascertain the therapeutic action, chemical examination will perfect the knowledge thus obtained, and will, with the aid of pharmacy, show the best mode of preparation and administration, and no institution can more efficiently carry out this work than the Pharmaceutical Society of Great Britain.

I will now proceed to make a few brief remarks on some medicinal plants which I brought with me from Ceylon.

1. *Randia dumetorum*, Lam.—The seeds of this tree are used by the natives of Ceylon and India as a reliable agent in producing emesis.

I am not aware that any chemical examination has been made to detect the active principle.

It belongs to the same family (Cinchonaceæ) as *Cephaelis Ipecacuanha*, and it would be important to determine if it contains emetine, more particularly since an allied species, *R. uliginosa*, is, according to Dr. Dymock, used in India as a remedy for dysentery. This species is also indigenous in Ceylon. The bark of *R. dumetorum* also possesses the same qualities.

I have seen the powdered seeds used with as good effect as ipecacuanha in doses of 5 to 10 grains. If analysis should prove *Randia* to possess the same active principle as ipecacuanha, a great saving might be effected by its substitution for the more expensive Brazilian drug.

2. *Sethia acuminata*, Arn.—This is a remedy much used by the Cinghalese as a vermifuge. The part used is the leaves, the juice of the leaves being mixed with sugar and castor oil, or with the powder of the leaves. The leaves are easily powdered when dried.

Professor Bentley notices its vermifuge properties in his "Manual of Botany."

Dr. Thwaites, in his "Enumeratio Plantarum Zeylaniæ," also refers to it. He says "the Cinghalese attach much value to this plant as an anthelmintic for children, giving the juice expressed from the fresh leaves." It is chiefly used for expelling round worm, and possesses the advantage of not having a disagreeable taste. The powder is used in the dose of 10 to 15 grains.

3. *Coscinium fenestratum*, Colebr.—Many years ago, while using it as a tonic, I found by experiment that it possessed *antiseptic* properties, to which I beg to invite your attention.

I found that pieces of beef immersed in an infusion of the stem

were preserved for several weeks. I am unable to give more details, as my notes made in Ceylon are not at hand.

I also used in Ceylon a weak infusion of the stem as a lotion for foul ulcers with great success.

I believe the plant has already been subjected to chemical analysis in this country, and contains the active principle berberia.

It has been used also as a yellow dye. As this drug has recently been imported in quantity into England it could easily be obtained, and an examination of the cause of its antiseptic properties seems desirable.

4. *Vateria Indica*, L.—The natives use the bark daily to arrest the alcoholic fermentation of the juice of the Jaggery palm, *Caryota urens*, which is a favorite beverage with them. This property of preventing fermentation might, I think, be turned to account in some of the great manufacturing industries, if not in medicine, and I trust the bark may be thought deserving of chemical investigation by some members of your Society.

5. *Semecarpus Gardneri*, Thw.—The black resin yielded by this tree, although not possessing medicinal properties, may be of some interest in the arts.

The resin is hard, breaks with a smooth fracture, burns with a bright flame, is soluble in turpentine, and adheres strongly to wood and metal. It is free from acridity.

The formula for using the resin as a varnish is as follows:

To a saturated solution of *Vateria Indica* resin in oil of turpentine, add by degrees pieces of black resin, and put it into a bottle and shake it well until the whole is dissolved, then apply it to wood or metal, which will give a varnish of great lustre and beauty. The resin should be first melted and strained through coarse calico or a sieve, to free it from impurities.

6. *Vernonia anthelmintica*, Willd.—This plant is cultivated by the Cinghalese, and is in great repute as a remedy, which is indicated by its name.

The seeds are black, of a bitter and nauseous taste, are easily procured from bazaars, and are commonly used by the village people for expelling the ascaris lumbricoides and act as a vermicide.

The dose of the powdered seed to an adult is from ½ to 1 drachm.

The native physicians prescribe it generally as a tonic in the shape of an infusion.

The Cinghalese name is *sanne nayan* and the Tamil name *kadoseragam.*

European practitioners in India, from personal observations, confirm the truth of the above statement.

7. *Alstonia scholaris*, R. Br.—In 1865 I forwarded to England, to my friend and correspondent, Mr. P. L. Simmonds, the Editor of the *Technologist*, specimens of a kind of caoutchouc, as a substitute for gutta-percha.

The following information supplied by me appeared in that periodical for August, 1865:

"Another substitute for gutta-percha, the milky juice of the *Alstonia scholaris*, a tree belonging to the natural order Apocyneæ, has been forwarded from Ceylon by Mr. Ondaatje; it is stated to possess the same properties and to be workable as gutta-percha. It readily softens when plunged in boiling water, is soluble in turpentine and chloroform, receives and retains impressions permanently, and is adapted for seals to documents."

The bark of this tree is thick and spongy. Its properties as a medicinal agent are fully described in the Pharmacopœia of India.

8. *Acorus Calamus*, Linn.—The well-known sweet flag I merely notice as an anthelmintic, which property is not included in the Indian Pharmacopœia.

An infusion of the rhizome or root-stock given to young children acts effectually, as I have seen many such cases treated among the natives.

I hope on a future occasion to be able to contribute further notes on the native materia medica of Ceylon.—*Phar. Jour. and Trans., April 7, 1883.*

GLEANINGS IN MATERIA MEDICA.

BY THE EDITOR.

Lycoperdon giganteum, the giant puff-ball, belongs to the natural order of trichagastres. The peridium, or outer coat, which breaks up into warts or scales, is intimately connected with the inner coat, and the spores are mostly sessile. All the various species of lycoperdon are produced abundantly in nearly every country, but are so variable both in character and properties, that it is very difficult to distinguish them. Dr. E. Thomson recalls attention in the "Lancet" to the use of this fungus as a local hæmostatic. He states that it forms a very

soft and comfortable surgical dressing, and that the powder it contains seems to contain antiseptic and anodyne properties. The mature plant is about the size of a child's head, and is covered with a thin skin; the latter is removed, and capillitium and spores which form a dusty mass are used. Mr. Fagan, a leading surgeon of Belfast, found that it at once restrained the bleeding from arteries in the bone, in the neighborhood of the orbit, after the failure of other means. The researches of Hagan show that the hæmostatic action of the puff-ball, as well as of all other spongy or powdery substances, depends upon the fact that healthy blood deposits hæmato-blasts or minute corpuscles on any foreign substances introduced into a vein, which become adhesive points for the subsequent attachment of particles of fibrin. This action, however, also takes place when the vessels themselves assume abnormal conditions, as when cut or altered by disease.— *Wm. Elborne in Phar. Jour. Trans.*, February 24, 1883, p. 688.

The fumes produced by the burning of this fungus have been used for stupefying bees and other insects, and for the anæsthesia of other animals, effects which are due to the presence in the fumes of carbonic oxide.—See *Am. Jour. Phar.*, 1855, pp. 376 and 464.

Adulteration of Powdered Pepper.—Prof. Charbonnier directs attention to an adulterant, which is not a new one, but at present appears to be very extensively employed in France, particularly for white pepper. This is the putamen of olives known in commerce as *grignons d'olive* (olive pits), or as *poivrette* (little pepper), a name probably given to it to create the belief as if it contained some of the properties of pepper. These olive pits were formerly burned up and used as manure (engrais); now it is found more advantageous to sell them at 25 or 30 francs for 100 kilos, and to use them for the adulteration of pepper. According to the treatment to which they are subjected, a gray or white powder is obtained adapted for the adulteration of powdered black or white pepper. The hard shell consists of elongated stone cells resembling those found in the epicarp of black pepper; but since white pepper is deprived of the pericarp, the adulteration of its powder with ground olive pits is readily detected under the microscope by the large number of stone cells.—*Rép. de Phar.* 1883, pp. 19–21.

The adulteration of pepper with olive pits is readily detected, according to Dupré, by dusting the powder upon a liquid composed of equal parts of glycerin and water, upon which the powdered pepper will float, while the powdered olive pits will sink.—*Monit. Prod. Chim.* xiii. 34.

Guadeloupe Vanilla.—Seven or eight years ago a new vanilla plantation was established in Guadeloupe, and for several years the vanilla has been met with in French commerce. It is quite distinct from the Mexican and Bourbon vanilla, and is thought by Professor Charbonnier to be probably derived from a variety of vanilla planifolia, and, perhaps, to undergo a different process of curing. Instead of being irregularly triangular, it is always flattened, of a blackish color, rather less dark than in the Bourbon and Java vanilla, is less frequently covered with crystals of vanillia, has a distinctive odor, is little wrinkled, and is marked with fine striæ in a longitudinal direction. While it is of good appearance, resembling Bourbon vanilla, its odor is less fine, and on use disappears quite rapidly. It is sold at about one half the price of Bourbon vanilla.—*Rép. de Phar.*, 1883, p. 18.

RECENT RESEARCHES ON THE PYRIDINE AND QUINOLINE BASES.

Ever since it was shown that a close connection exists between some of the important natural alkaloids and the derivatives of pyridine and quinoline, researches intended to aid in determining the nature and relationships of these derivatives have become more and more numerous, and at present the greatest activity prevails in this field of chemistry. All the evidence accumulated thus far is in harmony with the view that many of the important alkaloids are derivatives of pyridine, in the same sense that the so-called aromatic compounds are derivatives of benzene; and as the study of the isomeric derivatives of benzene has led to important synthetical results, so similar work in the pyridine series will probably lead to the synthesis of some of the alkaloids.

Pyridine Series, $C_nH_{2n-5}N$.—These bases were discovered by Anderson in bone oil, and found by Thenius to be present in coal tar. Cahours and Etard, in 1880, succeeded in obtaining them from nicotine by dry distillation. As thirty years had elapsed since the time of Anderson's work, and these bases had in the meantime assumed a considerable degree of importance, Richard, and Weidel, and Herzig again undertook the study of bone oil. As a result of their labors we now know that, besides pyridine, there are present in bone oil two isomeric picolines, two lutidines, and two collidines. Perkin, in 1865, first observed the artificial production of pyridine by the action of nascent hydrogen on azodinaphthyldiamine, and since then the synthesis of this base has been frequently attempted. Methods have been described by Chapman and Smith, by Ramsay, and more recently by Königs, which yield small quantities of pyridine, but for its preparation in quantity we are still dependent upon bone oil. To obtain pyridine and its homologues, bone oil is warmed with dilute sulphuric acid, the filtered solution precipitated with sodium hydroxide, and the free bases separated by fractional distillation.[1] The most rapid method of

[1] Richard, Bulletin de la Société Chimique, xxxii, 487.

obtaining pure pyridine is to distil the calcium salt of nicotinic acid with lime.[1] Of the three picolines theoretically possible Weidel has found two in bone oil, while Baeyer[2] has made a third by the distillation of acroleïn-ammonia. Lutidine had not been made synthetically until very recently. Hantzsch[3] describes a method which enabled him to make the first four members of this series of bases. By heating acetoacetic ester with aldehyde-ammonia in the proportion of two molecules of the former to one of the latter, there is formed a crystalline condensation product which is the ester of dihydro-collidine-dicarbonic acid $(C_2H_5OOC)_2C_8H_{11}N.H_2$. By the oxidizing action of nitrous acid two atoms of hydrogen are removed, and there remains the ester of collidine-dicarbonic acid. This by saponification yields the corresponding acid, which when distilled with lime gives collidine,

$$\underset{\text{Collidine-dicarbonic acid.}}{C_5(CH_3)_3(COOH)_2N} - 2CO_2 = \underset{\text{Collidine.}}{C_5(CH_3)_3H_2N}.$$

By careful oxidation with potassium permanganate, collidine dicarbonic acid yields three successive oxidation products, each of which in turn can be converted into its corresponding base. Thus the first oxidation product gives lutidine,

$$\underset{\text{Lutidine-tricarbonic acid.}}{C_5(CH_3)_2(COOH)_3N} - 3CO_2 = \underset{\text{Lutidine.}}{C_5(CH_3)_2H_3N};$$

the second, picoline,

$$\underset{\text{Picoline-tetracarbonic acid.}}{C_5(CH_3)(COOH)_4N} - 4CO_2 = \underset{\text{Picoline.}}{C_5(CH_3)H_4N};$$

and the third, pyridine,

$$\underset{\text{Pyridine-pentacarbonic acid.}}{C_5(COOH)_5N} - 5CO_2 = \underset{\text{Pyridine.}}{C_5H_5N}.$$

Other methods for the preparation of collidine are known. Baeyer and Ador[4] have obtained it by heating an alcoholic solution of aldehyde-ammonia to 120°. Krämer,[5] by heating ethylidene chloride with alcoholic ammonia, observed its formation; while more recently Würtz[6] obtained it by the distillation of aldol-ammonia. The higher members of this series, parvoline, corridine, rubidine, and viridine have not yet been made synthetically.

The hypothesis of Körner, according to which the pyridine molecule is regarded as benzene, in which one of the six CH groups is replaced by an atom of nitrogen, has found additional support during the last three years. Accepting this hypothesis, but one pyridine is theoretically possible, and indeed it has been found that from whatever source obtained, whether from bone oil, from coal tar or from nicotine, cinchonine or quinoline, pyridine always has the same boiling point, the same specific gravity, and the same physical and chemical properties. Picoline, the second member

[1] Laiblin, Annalen der Chemie, cxcvi, 159.
[2] Ibid, clv, 283.
[3] Ibid, ccxv, 1.
[4] Annalen der Chemie, clv, 297.
[5] Berichte der deutschen chemischen Gesellschaft, iii, 202.
[6] Comptes Rendus, lxxxviii, 454.

of the series, being regarded as a methyl derivative of pyridine, three isomers are possible, and corresponding to each there should be a pyridine-monocarbonic acid. Three picolines are known, and Weidel and Herzig[1] obtained the third pyridine monocarbonic acid possible by heating lutidinic acid. Nine lutidines are predicted by theory, six dimethyl- and three ethyl pyridines Only two of the former are known. On the other hand, six pyridine-dicarbonic acids have been isolated. We can conceive of the formation of collidines by replacing the hydrogen of pyridine either by three methyl groups, by one propyl group, one isopropyl group, or by one methyl and one ethyl group. There are thus possible six trimethyl pyridines, three propyl pyridines, three isopropyl pyridines, and ten methyl ethyl pyridines; in all, twenty-two collidines. A number of these are already known, but our knowledge of their properties, physical constants, and especially their oxidation products, is so limited that at present it is impossible to classify them.

The homologues of pyridine and of quinoline, as well as quinoline itself, and certain natural alkaloids, such as quinine, cinchonine, nicotine, etc., when oxidized yield nitrogenous acids, which may be regarded as carboxyl derivatives of pyridine. Distilled with lime they give pyridine just as benzoic, phthalic acids, etc., under the same conditions give benzene. Pyridine itself offers a much greater resistance to oxidizing agents than benzene; chromic acid, and even boiling fuming nitric acid, have no effect upon it. Huber first obtained nicotinic acid (pyridine monocarbonic acid) by oxidizing nicotine, and in 1871 Dewar obtained the same acid by the oxidation of a picoline. By oxidizing the mixture of picolines contained in bone oil, Weidel[2] obtained two isomeric pyridine monocarbonic acids, which he calls nicotinic and picolic acids, and by oxidizing lutidine Weidel and Herzig[3] succeeded in isolating the third isomer possible, which they call isonicotinic acid. Wischnegradsky[4] oxidized the aldehyde collidine of Baeyer, and obtained a methyl-pyridine-dicarbonic acid; while Hoogewerf and van Dorp[5] have obtained pyridine tricarbonic acid by oxidizing quinine and cinchonine with potassium permanganate. A second acid of this composition has been obtained by Böttinger[6] from uvitonic acid.

The pyridine bases have the power of uniting directly with two, four or six atoms of hydrogen. Wischnegradsky[7] has described a hexahydrolutidine which has the properties of a secondary base. The isochlor-pyridine of Ciamician and Dennstedt[8] can also unite with six atoms of hydrogen. Hofmann[9] has devised a general method for building up the hydropyridines. By distilling a mixture of a pyridine ammonium iodide with potassium hydroxide, oxygen is liberated, potassium iodide formed, and

[1] Monatshefte für Chemie, i, 41.
[2] Berichte der deutschen chemischen Gesellschaft, xii, 1989.
[3] Monatshefte für Chemie, i, 48.
[4] Berichte der deutschen chemischen Gesellschaft, xii, 1506.
[5] Annalen der Chemie, ccix, 84.
[6] Berichte der deutschen chemischen Gesellschaft, xiii, 2048, and xiv, 134.
[7] Bulletin de la Société Chimique, xxxiv, 340.
[8] Berichte der deutschen chemischen Gesellschaft, xiv, 1153.
[9] Ibid, xiv, 1497.

the hydrogen of the hydroxide takes the place of the iodine in the base. Thus with the iodide of methyl-pyridylammonium this reaction takes place,

$$C_5H_5N.CH_3I + KOH = O + KI + C_5H_5NCH_3H.$$

Methyl pyridyl ammonium iodide. — Dihydro-picoline.

As these hydro-bases can be readily transformed into the bases themselves, the reaction of Hofmann becomes the more valuable, because it enables us to pass directly from any member of the series to the next higher.

According to Wischnegradsky the pyridine bases exist in the state of hydrides in the alkaloids. From the labors of Königs[1] and of Schotten,[2] we know that piperidine is the hexahydropyridine, and more recently Oeschner de Koninck[3] has found tetrahydroquinoline in the crude quinoline obtained by distilling cinchonine with sodium hydroxide. The researches of Cahours and Etard have shown that nicotine is a tetrahydroisodipyridine, while further evidence in favor of this idea is to be found in the work of Weidel and Russo.[4] Starting with pyridine, C_5H_5N, treating with metallic sodium, they obtained dipyridyl $C_{10}H_8N_2$. Treated with nascent hydrogen, dipyridyl takes up six atoms, and there is formed isonicotine, $C_{10}H_{14}N_2$.

A number of substitution products of pyridine are known. Hofmann, Anderson, and Ciamician and Dennstedt have described chlorine and bromine derivatives. O. Fischer[5] obtained pyridine-sulphonic acid by heating pyridine with an excess of concentrated sulphuric acid, and from this, by means of well-known reactions, he prepared the cyanide and the corresponding acid.

Quinoline Series, $C_nH_{2n-11}N$.—By distilling quinine, cinchonine or strychnine with potassium hydroxide, Gerhardt[6] obtained a substance having the properties of an energetic base, which he called quinoline. Two years previous, in 1843, Runge had discovered leucoline, a base of the same composition occurring in coal tar. Hofmann[7] finding that leucoline and quinoline gave the same crystalline precipitate with chromic acid, concluded that the two bases were identical. The study of these compounds was undertaken in 1860 by C. G. Williams, and he succeeded in isolating the parallel series of homologous bases, as follows:

Quinoline,	C_9H_7N	Leucoline.
Lepidine,	$C_{10}H_9N$	Iridoline.
Dispoline,	$C_{11}H_{11}N$	Cryptidine.
Tetrahiroline,	$C_{12}H_{13}N$.	

By the decomposition of the alkaloids with caustic potassa, bases of the first series are exclusively formed, while the members of the second series

[1] Ibid, xii, 2341.
[2] Ibid, xv, 421.
[3] Annales de Chimie et de Physique (5), xxvii, 433.
[4] Monatshefte für Chemie, iii, 850.
[5] Berichte der deutschen chemischen Gesellschaft, xv, 62.
[6] Annalen der Chemie, xlii, 310, and xliv, 279.
[7] Ibid. liii, 427.

occur in coal tar. In properties these bodies resemble the pyridine bases. Towards alkyl iodides they act like tertiary amines, and on oxidation they are transformed into pyridine carbonic acids. Pure quinoline, free from its homologues, may be prepared by heating cinchonine with copper oxide and caustic potassa.[1] Königs[2] has made it synthetically by passing the vapor of allyl-aniline, $C_6H_5NHC_3H_5$, over heated lead oxide. Baeyer,[3] by treating hydrocarbostyril with phosphorus pentachloride, obtained dichlorquinoline, which by nascent hydrogen was converted into quinoline. The dry distillation of acridate of calcium or of acroleïn-aniline also yields quinoline.[4] Böttinger[5] states that the hydrochlorate of aniluvitonic acid when heated with soda lime is converted into quinoline. But these methods are only of scientific interest, and it is to the work of Skraup[6] that we owe a process for the synthesis of quinoline and its homologues which is not only of the greatest theoretical value and of general application, but at the same time it is an economical method for the production of these bases in quantity. The details of the process have been described in the "American Chemical Journal." iv, p. 63.

The synthesis of lepidine, the second member of the series, has been effected by Döbner and Miller.[7] The method is analogous to that of Skraup, and consists in heating a mixture of aniline, nitrobenzene, sulphuric acid and glycol or paraldehyde.

The quinoline bases when oxydized are transformed into pyridine-carbonic acids, quinoline itself yielding cinchomeronic acid or pyridine-dicarbonic acid. This fact indicates a close connection between the quinoline bases and such alkaloids as quinine, cinchonine and their isomers, because these two when oxidized are converted into pyridine di or tricarbonic acids. Quinoline, like the pyridine bases, has the power of forming hydrides by treatment with tin and hydrochloric acid. Wischnegradsky[8] obtained from it tetrahydroquinoline, and Jackson[9] has also described a tetrahydroquinoline, both of which are secondary bases. They are very unstable substances, and the weakest oxydizing agents change them back into quinoline.

Among the substitution-products of quinoline are the oxyquinolines or quinophenols analogous to the naphthols in their mode of formation, properties and general reactions. Nitroquinoline, like nitronaphthalene, readily yields the amine, and the cyanogen derivatives can be transformed in the usual way into the quinoline-carbonic acids. In fact, the synthesis of quinoline and the analogies existing between its derivatives and those of napthalene seem to justify Körner's structural formula. According to his hypothesis quinoline has a structure analogous to that of naphthalene, and bearing the same relation to pyridine that naphthalene does to benzene; and as one of the CH groups of naphthalene is supposed to be replaced by

[1] Wischnegradsky, Berichte der deutschen chemischen Gesellschaft, xiii, 2318.
[2] Ibid. xii, 453.
[3] Ibid. xii, 1320.
[4] Graebe and Caro, Ibid. xiii, 99.
[5] Ibid. xiii, 2165.
[6] Monatshefte für Chemie, i, 316, and ii, 139 and 171.
[7] Berichte der deutschen chemischen Gesellschaft, xiv, 2812.
[8] Bulletin de la Société Chimique, xxxiv, 340.
[9] Berichte der deutschen chemischen Gesellschaft, xiv, 886.

an atom of nitrogen, we see the possibility of two such substances corresponding with the α and β monosubstitution products of naphthalene. Because of its formation from dichlorquinoline Baeyer regards quinoline and its homologues as belonging to the α series; leucoline and its homologues would hence belong to the β series. But it is still an open question whether leucoline is really isomeric with quinoline. Hofmann regarded them as identical, but C. G. Williams pointed out that quinoline with amyl iodide yields the blue coloring matter cyanine, while leucoline has not this property. Hoogewerf and Van Dorp[1] have confirmed the statement of Williams; but, on the other hand, quinoline and leucoline when oxidized with potassium permanganate give the same pyridine-dicarbonic acid. *Amer. Chem. Jour.* v. p. 60. E. H. K.

MINUTES OF THE PHARMACEUTICAL MEETING.

In the absence of the President Mr. Alonzo Robbins was called to the chair. The minutes of the last meeting were read and approved.

Prof. Maisch remarked, in relation to the minutes of the last meeting, that a correspondent had called his attention to the fact that the drug *abutua* is stated by the Portuguese Pharmacopœia to be pareira brava; he also showed a list of the common and botanical names of a number of useful Brazillian plants, published by Dr. T. Peckolt, in a recent number of the Austrian Pharmaceutical Journal, and in which abutua is stated to be Botryopsis platyphylla, *Miers*, nat. ord. menispermaceæ.

Prof. Maisch presented to the Library two volumes of "Hubbard's Newspaper and Bank Directory of the World," and stated that for some months he had examined the statements about a number of small places in Europe, about which he was familiar, and was agreeably surprised to find them accurate.

A few questions relative to the *lactometers* which were alluded to were asked, and Prof. Maisch described one in which the opacity of the milk was defermined by the depth to which the scale could be immersed in the fluid and still be legible, the greater the depth to which it could be immersed the poorer the milk. Mr. Heinitsh alluded to an instrument imported by Sharp & Dohme, of Baltimore, which was much praised, but seems never to have been introduced very extensively into use; the quality of milk is ascertained from the color of a few drops of it.

Mr. Gustavus Pile read a paper on the *Alcohol tables of the new Pharmacopœia* (see page 303), which differ from those recognized by law in the United States, notably in the strength of *proof spirit*, for which the Pharmacopœia gives that recognized in Great Britain. He likewise directed attention to the error in the statement of the volumetric percentage of alcohol; for instance alcohol of 94 per cent. by volume does not contain 6, but 7.29 per cent. by volume of water, the excess over 100 volumes being due to condensation.

Prof. Maisch said that finding the U. S. Pharmacopœia authority for the

[1] Annalen der Chemie, clv, 117.

statement that proof spirit had the specific gravity ·9198, he thought that possibly the strength might have been changed by law, and had applied to Mr. Pile for information. There were other shortcomings in the tables admitted into the Pharmacopœia without a word of explanation; in this country it was customary to express the specific gravity of liquids by comparing their weight at 15° or 15·6° C (59° or 60° F.) with the weight of the same volume of water at the same temperature; he thought that all our specific gravity bottles were thus made. In most of the tables of the specific gravity of acids at 15°C. the base of comparison was water at its greatest density, 4°C., and these could, therefore, not agree with the results of determinations made with the instruments in common use, except after calculation; the Pharmacopœia should at least have explained this difference.

Mr. Pile stated that he would continue the examination of the alcohol tables.

Memoranda giving the weight of one fluidounce of various tinctures prepared according to the old and new Pharmacopœias were handed in by Messrs. Lowe, Robbins, Wolff and the Registrar; they were referred to Prof. Maisch at whose suggestion they had been made.

Mr. McIntyre exhibited a specimen of chemical food, or *compound syrup of phosphates*, made with phosphate of iron of the Pharmacopœia, 1880, both colored and plain.

A specimen of *oil of wintergreen* was exhibited. It is well known that much of the oil of wintergreen of commerce is made from the sweet birch twigs, as had been shown by Mr. G. W. Kennedy, of Pottsville. Reference was also made to the statement of Mr. Underhill (see "Amer. Jour. Phar.," 1883, p. 197) that the actual cost of collecting gaultheria leaves was greater than the oil can be bought for, without estimating the labor or fuel value of apparatus used in preparing it. Specimens of colorless and of artificial oil of wintergreen exhibited at the Centennial Exhibition in 1876 were also commented on.

Prof. Power inquired whether it had yet been proven that the oil of sweet birch and that of winter green were identical in composition. He had thought it likely that they might be compound ethers of different alcohols. Prof. Maisch said that Prof. Procter had probably determined that in 1843, in his examination of sweet birch bark.

There being no further business the meeting adjourned.

T. S. WIEGAND, *Registrar.*

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

SAINT LOUIS COLLEGE OF PHARMACY.—The annual meeting was held April 30th, 1883, when the annual reports were presented and the following officers elected for the ensuing year: President, H. E. Hoelke; Vice President, Chas. Gietner; Recording Secretary, W. C. Bolm; Corresponding Secretary, W. H. Crawford; Treasurer, S. Boehm; Board of Trustees for two years, Joseph C. Kirkbride, F. W. Sennewald, and George Ude. Mr. Edmund P. Walsh, who had faithfully served the College as Secretary for

sixteen years and declined a re-election, was presented with an elegant mantel clock and pair of statuettes.

THE CALIFORNIA COLLEGE OF PHARMACY opened its eleventh lecture session April 20th, on which occasion the new building just erected, was dedicated to its future use.

THE MASSACHUSETTS STATE PHARMACEUTICAL ASSOCIATION held its annual meeting in Springfield, May 16th and 17th. About 200 members were present and 79 new members were elected, making the present membership 387. The President, S. A. D. Sheppard, in his annual address, earnestly discussed pharmaceutical affairs in general, and gave words of wise counsel and thoughtful suggestions in regard to the policy and the work of the Association. He was re-elected, though urgently requesting permission to retire. The usual reports of officers and committees were read; a number of good papers were presented and fully discussed; the feeling in favor of a pharmacy law seems to be growing, and another effort for its passage will be made. The next annual meeting will be held in Lowell.

VIRGINIA STATE PHARMACEUTICAL ASSOCIATION.—The opening exercises of the second annual meeting took place in the Academy of Music, Norfolk, on the evening of May 15th. Several addresses were made, applications were received and other preliminary business transacted. The regular business sessions were held on the following day in the hall of the local organization. The different sections of the State were well represented.

IOWA STATE PHARMACEUTICAL ASSOCIATION.—The annual meeting was held in Library Hall, Davenport, May 1st and 2d. President A. R. Townsend, in the chair. The annual address of the President and the reports of officers and committees were read and appropriately disposed of. Recent legislation in Iowa having, practically, made the druggists the sole dispensing agents for liquors, a resolution was introduced by Mr. W. S. McBride, and adopted unanimously, recommending a well regulated restrictive license law for the liquor trade and the further perfection of the pharmacy law, so far as it relates to the sale of liquors. The trade in specialties and proprietary medicines and various plans for preventing undue competition, were referred to the Committee on Trade Interests. Several papers were read, and the following officers were elected: President, J. H. Harrison, Davenport; Vice Presidents, A. H. Miles, Des Moines, C. R. Wallace, Independence, W. S. McBride, Marshalltown; Treasurer, C. H. Ward, Des Moines; Secretary, E. L. Boerner, Iowa City; Local Secretrry, C. J. Lander, Marshalltown. A large number of new members and the following honorary members were elected: O. F. Fuller and P. Van Schaack, Chicago; J. M. Maisch and Charles A. Tufts. The next meeting will be held in Marshalltown on the third Tuesday of May, 1884.

MISSISSIPPI STATE PHARMACEUTICAL ASSOCIATION.—There is a favorable prospect for the early organization of such an association. Mr. Edgar

Delćry, of Bay, St. Louis, is working earnestly towards this end, and it is to be hoped that his efforts may be successful. Mississippi was one of the first States in which a pharmaceutical society embracing pharmacists from all parts of the State, had been formed. This occurred May 29th, 1871, and for several years afterwards its delegates were present at the meetings of the American Pharmaceutical Association. The two States directly east, Alabama and Georgia, and the two directly west, Louisiana and Texas, have pharmaceutical associations, and it would seem that a revival of the Mississippi association should meet with hearty support.

DAUPHIN CO., PA., PHARMACEUTICAL ASSOCIATION.—A permanent organization was effected at Harrisburg May 11th, with a membership of 24; a constitution and by-laws were adopted and the following officers elected: President, D. W. Gross; Vice President, Dr. W. H. Egle; Secretary, Dr. J. A. Miller; Treasurer, Dr. G. H. Markley; Executive Committee, Messrs. Chas. T. George, I. D. Lutz, and J. Wilson Hoffa.

EDITORIAL DEPARTMENT.

OBJECTIONS URGED AGAINST THE NEW PHARMACOPŒIA.—Prof. Oldberg has done good service by a paper published in the May number of the "St. Louis Courier of Medicine," in which he considers the various objections and answers them in a clear and convincing way. The objections urged are,

1. Hazardous increase of strength. Prof. Oldberg shows that all preparations that could possibly be classed under this head are the following:

Solution of Arsenious Acid,	former dose,	5	minims;	present dose,		4⅓	minims.
Fowler's Solution,	" "	5	"	" "		4⅓	"
Tincture of Opium,	" "	13	"	" "		11	"
Tincture of Aloes,	" "	1 to 6	fl. dr.	" "		½ to 2	fl. dr.
Tincture of Cantharides,	" "	10	minims,	" "		7	minims.
Tincture of Capsicum,	" "	20	"	" "		14	"
Tincture of Lobelia,	" "	40	"	" "		30	"

But he very correctly argues that any great reduction in strength would be quite as harmful as the changes in the other direction. To assist the opponents he gives the following table:

Vinegar of Lobelia,	former dose,	40	minims;	present dose,		55	minims.
Vinegar of Opium,	" "	7	"	" "		11	"
Vinegar of Sanguinaria,	" "	15	"	" "		20	"
Vinegar of Squill,	" "	15	"	" "		20	"
Tincture of Aconite,	" "	2½	"	" "		3	"
Tincture of Cannabis Indica,	" "	10	"	" "		17	"
Tincture of Stramonium,	" "	10	"	" "		13	"
Tinct. of Veratrum viride,	" "	5	"	" "		5½	"
Wine of Opium,	" "	8	"	" "		11	"

On another page of the present number we have more fully entered into this subject, and cited additional examples from practice to show that in nearly all cases the changes in strength are of no practical importance, and that, with very few exceptions, the average dose is scarcely affected.

2. The abolition of fluid measures. This was done in obedience to instructions received, and had already been partly adopted by previous Pharmacopœias; it aims at an exactness which can be far more conveniently reached by careful weighing than by careful measuring. It does not necessitate the prescribing and dispensing by weight. Since liquid preparations are always administered by measure, Prof. Oldberg holds that each tincture should be so prepared that a convenient and easily remembered quantity by measure of the preparation shall represent a simple and easily remembered quantity of the drug. We agree with this proposition, and since it has been shown that with the few exceptions cited, there are no differences in the doses of the corresponding old and new preparations, this aim has been reached as far as the proportions are concerned to which we have become accustomed by long usage, while at the same time the processes have been made as exact as possible by the exclusive use of weights. We believe also that the same end might have been attained with the fluid extracts, which now occupy an anomalous position. We have no doubt that the greater exactness will be gradually recognized, as pharmacists, more particularly the younger pharmacists, become accustomed to the use of weights for liquids. The ultimate end in view by Prof. Oldberg, to fix the strength of all liquid preparations with some regard to their uses and doses, instead of by uniform mathematical proportions, certainly deserves attention in the future; if found advisable, we think it may be reached without discarding the use of weights in the process of making them.

3. The forced introduction of the metric system upon an unwilling constituency. This objection may certainly be dismissed with the answer that it is not true; but Prof. Oldberg also shows *why* it is not true. In the practical application of the working formulas *any* system of weights, or in certain cases measures, may be used, and physicians may prescribe either by weight or measure of any system.

Prof. Oldberg concludes as follows: "All who have the best interests of medicine and pharmacy at heart will try to build up instead of tearing down, the national standard, and will seek to find out its real defects, not to condemn the book, but to improve it." With all the care that has been bestowed upon it for years, there are shortcomings which it is the duty of every pharmacist and physician to assist in remedying.

OBITUARY.

Dr. Edward Peat died of acute consumption at Delphos, O., April 19th, aged 28 years. He was a graduate of the Philadelphia College of Pharmacy class of 1878, and subsequently studied medicine at the Jefferson Medical College. He was an earnest student and by faithful attendance to his duties had secured a lucrative practice.